DISCOVERY REPORTS

Issued by the Discovery Committee, Colonial Office, London
on behalf of the Government of the Dependencies of the Falkland Islands

Vol. II, pp. i–vi

TITLE-PAGE AND LIST OF CONTENTS

CAMBRIDGE
AT THE UNIVERSITY PRESS
1931

Price ninepence net

Cambridge University Press
Fetter Lane, London

New York
Bombay, Calcutta, Madras
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PRINTED IN GREAT BRITAIN

CONTENTS

CORRIGENDUM

P. 376, Fig. 1, *for* $\times$ 1 *read* $\times\frac{1}{2}$.

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IN GREAT BRITAIN
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WALTER LEWIS MA
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UNIVERSITY
PRESS

DISCOVERY REPORTS

Vol. II, pp. 1–222, text-figs. 1–91

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POLYCHAETE WORMS

by

C. C. A. Monro, M.A.

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AT THE UNIVERSITY PRESS
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[*Discovery Reports. Vol. II, pp.* 1–222, *text-figs.* 1-91, *October,* 1930.]

POLYCHAETE WORMS

By

C. C. A. MONRO, M.A.

CONTENTS

POLYCHAETE WORMS

By C. C. A. Monro, M.A.[1]

(Text-figures 1–91)

INTRODUCTION

THE Polychaeta studied in this report were all collected by the staff of the Discovery Investigations in the R.R.S. 'Discovery,' in the R.S.S. 'William Scoresby,' in the Floating Whaling Factory S.S. 'Anglo-Norse' off the South Sandwich Islands, and by the personnel of the Marine Biological Station at South Georgia and at Saldanha Bay, South Africa. A few specimens were also procured by a member of the staff in a trawler off the Cape of Good Hope.

The stations made by the 'Discovery' have no letters prefixed to the numbers: those of the 'William Scoresby' have the prefix WS, those of the S.S. 'Anglo-Norse' SS (for South Sandwich), and those of the Marine Biological Station MS.

The following summary of stations, taken from the Station List published by the Discovery Investigations, gives the courses sailed by the 'Discovery' and the 'William Scoresby.'

'*Discovery*.' Stations 1–2, Ascension Island; 3, Mid South Atlantic; 4–6, Tristan da Cunha; 7–12, Tristan da Cunha to South Georgia; 13–45, off South Georgia; 46–47, South Georgia to Falkland Islands; 48–58, off Falkland Islands; 59–89, Falkland Islands to Cape Town; 90–101, off South-west Africa; 102–116, South Africa to Bouvet Island; 117–121, Bouvet Island to South Georgia; 122–159, off South Georgia; 160–161, South Georgia to South Orkneys; 162–167, off South Orkneys; 168–170, South Orkneys to South Shetlands; 171–177, Bransfield Strait, South Shetlands; 178–192, Palmer Archipelago; 193–209, Bransfield Strait, South Shetlands; 210–221, Drake Strait; 222–230, Cape Horn to Falkland Islands; 231–259, Falkland Islands to Cape Town; 260–265, off South-west Africa; 266–299, Cape Town to Cape Verde Islands.

'*William Scoresby*.' Stations WS 1–4, off South-west Africa; WS 5–17, Cape Town to South Georgia; WS 18–65, off South Georgia; WS 66–70, South Georgia to Falkland Islands; WS 71–99, off Falkland Islands and between Falkland Islands and South America; WS 100–107, Falkland Islands to Port Desire, South America; WS 108–109, North of Falkland Islands; WS 110–114, off South Georgia; WS 115–121, South Georgia to Gough Island; WS 122–130, off Gough Island; WS 131–136, Gough Island to Cape Town.

The Marine Biological Station made seventy-four stations at South Georgia and eight stations at South Africa. The location of the SS stations has already been given.

[1] Published by permission of the Trustees of the British Museum.

GEAR

In the station lists the following symbols represent the various kinds of gear used:

B	Oblique.
H	Horizontal.
V	Vertical.
BTS	Small beam trawl. Beam 8 ft. in length (2·45 m.): mesh at cod-end ½ in. (12·5 mm.).
DC	Conical dredge. Mouth 16 in. in diameter (40·5 cm.), with canvas bag.
DL	Large dredge. Light pattern, 4 ft. in length (1·2 m.).
DLH	Large dredge. Heavy pattern, 4 ft. in length (1·2 m.).
DS	Small dredge. 2 ft. in length (0·6 m.).
LH	Hand lines.
N 4–T, N 7–T	Nets with mesh of 4 mm. or 7 mm. (0·16 in. or 0·28 in.) attached to back of trawl.
N 50	50 cm. tow-net. Mouth circular, 50 cm. in diameter (19·5 in.): 200 meshes to the linear inch.
N 70	70 cm. tow-net. Mouth circular, 70 cm. in diameter (27·5 in.): mesh graded, at cod-end 74 to the linear inch.
N 100	1 m. tow-net. Mouth circular, 1 m. in diameter (3·3 ft.): mesh graded, at cod-end 16 to the linear inch. From July 1, 1927, this net was replaced by another, of similar pattern, but with the cod-end made of stramin with 11–12 meshes to the linear inch.
N 450	4½ m. tow-net. Mouth circular, 4½ m. in diameter (14·8 ft.): mesh graded, at cod-end 7 mm. (0·28 in.).
NC 50	Coarse 50 cm. tow-net. Mouth circular, 50 cm. in diameter (19·5 in.): 25 meshes to the linear inch.
NCS–N, NCS–T	Tow-net of coarse silk, with 16 meshes to the linear inch, attached to trawl or other net.
NH	Hand net.
NRL	Large rectangular net. Frame 8 ft. long and 2¼ ft. wide (2·45 m. × 0·7 m.) with bag of ½ in. mesh (12·5 mm.).
NRM	Medium rectangular net. Frame 4 ft. long and 1¼ ft. wide (1·22 m. × 0·38 m.) with bag of 7 mm. mesh (0·28 in.).
OTC	Commercial otter trawl. Head rope 80 ft. long (24·5 m.): mesh at cod-end 1½ in. (3·8 cm.).
OTL	Large otter trawl. Head rope 40 ft. long (12·2 m.): mesh at cod-end 1¼ in. (3·2 cm.).
OTM	Medium otter trawl. Head rope 30 ft. long (9·14 m.): mesh at cod-end 1¼ in. (3·2 cm.).
RM	Mussel rake.
TYF	Young fish trawl. Mouth about 20 ft. in circumference (6 m.): bag of stramin with 11–12 meshes to linear inch. Fished until July 1926 with poles and otter-boards, thereafter attached to a circular tow-net frame 2 m. in diameter (6·6 ft.).

Table I shows the number of times each gear was used in procuring the present collection, and the number of species and specimens caught by each gear.

TABLE I

Gear	Times used	No. of species caught	No. of specimens caught	Gear	Times used	No. of species caught	No. of specimens caught
BTS	79	42	320	NC 50	3	3	8
DC	18	15	109	NCS–N	2	1	8
DL	32	35	256	NCS–T	17	16	73
DLH	172	91	1061	NH	17	13	71
DS	7	8	32	NRL	42	35	143
LH	6	6	17	NRM	4	6	45
N 4–T	35	29	230	OTC	105	31	388
N 7–T	10	10	36	OTL	179	91	1001
N 50	1	2	2	OTM	13	13	41
N 70	6	14	56	RM	23	19	276
N 100	20	16	127	TYF	43	19	62
N 450	3	3	3				

SUMMARY OF RESULTS

SYSTEMATIC

There follows a list of species.

Benthic species

Family AMPHINOMIDAE

Hermodice carunculata (Pallas), var. *didymobranchiata* (Baird).
Eurythoë complanata (Pallas).
Eurythoë chilensis, Kinberg.
Chloeia viridis, Schmarda.
Notopygos megalops, McIntosh.
Amphinome vagans (Savigny).
Paramphinome australis, n.sp.
Euphrosyne capensis, Kinberg.
Euphrosyne arctia, Johnson.

Family APHRODITIDAE

Aphrodite alta, Kinberg.
Laetmonice producta, Grube.

Family POLYNOIDAE

Hermadion ferox, Baird.
Hermadion magalhaensi, Kinberg.
Malmgrenia micropoides, Augener.
Euphione elisabethae, McIntosh.
Scalisetosus pellucidus (Ehlers).
Lepidonotus semitectus, Stimpson.
Eulagisca corrientis, McIntosh.
Eunoë opalina, McIntosh.
Eucrantha mollis (McIntosh).
Polyeunoa laevis, McIntosh.
Polynoë antarctica Kinberg.
Harmothoë magellanica (McIntosh).
Harmothoë spinosa, Kinberg.
Harmothoë exanthema (Grube).
Harmothoë anderssoni, Bergström.
Harmothoë crosetensis (McIntosh).
Harmothoë (Evarnella) impar (Johnston), var. ***notialis***, var. nov.
Harmothoë (Evarnella) kerguelensis (McIntosh).
Harmothoë (Barrukia) cristata (Willey).
Harmothoë (Barrukia) curviseta, n.sp.
Antinoë setobarba, n.sp.
Antinoë antarctica (Bergström).
Antinoë epitoca, n.sp.

Family ACOETIDAE

Eupanthalis tubifex (Ehlers).
Polyodontes mortenseni, Monro.

Family SIGALIONIDAE

Euthalanessa dendrolepis (Claparède).
Leanira incisa, Grube.

Family PHYLLODOCIDAE

Eteone sculpta, Ehlers.
Eteone aurantiaca, Schmarda.
Eteone rubella, Ehlers.
Phyllodoce patagonica, Kinberg.
Phyllodoce (Anaitis) bowersi, Benham.
Phyllodoce oculata, Ehlers.
Phyllodoce longipes, Kinberg.
Austrophyllum charcoti (Gravier).
Genetyllis polyphylla (Ehlers).
Eulalia magalhaensis, Kinberg.
Eulalia viridis (O. F. Müller).
Eulalia anomalochaeta, n.sp.
Eulalia subulifera (Ehlers).
Eulalia picta, Kinberg.

Family HESIONIDAE

Orseis sp.
Leocrates diplognathus, Monro.

Family SYLLIDAE

Pionosyllis comosa, Gravier.
Pionosyllis maxima, n.sp.
Eusyllis kerguelensis, McIntosh.
Trypanosyllis gigantea (McIntosh).
Trypanosyllis gemmulifera, Augener.
Autolytus charcoti, Gravier.
Autolytus gibber, Ehlers.
Autolytus simplex, Ehlers.
Autolytus (Sacconereis) sp.
Grubea clavata (Claparède).
Syllis prolixa, Ehlers.
Syllis brachychaeta, Schmarda.
Syllis brachycola, Ehlers.
Syllis variegata, Grube.
Syllis sclerolaema, Ehlers.

Family NEREIDAE

Nereis kerguelensis, McIntosh.
Nereis callaona, Grube.
Nereis eugeniae (Kinberg).
Nereis typhla, n.sp.
Nereis pelagica, L.
Platynereis magalhaensis, Kinberg.
Platynereis dumerilii (Milne-Edwards).
Leptonereis loxechini, Kinberg.
Nereis (Eunereis) hardyi, n.sp.
Ceratonereis vittata, Langerhans.

Family NEPHTHYDIDAE

Nephthys macrura, Schmarda.
Nephthys lyrochaeta, Fauvel.
Nephthys serratifolia, Ehlers.

Family SPHAERODORIDAE

Ephesia antarctica, McIntosh.

Family GLYCERIDAE

Glycera capitata, Oersted.
Glycera tesselata, Grube.
Glycera convoluta, Keferstein.
Goniada congoensis, Grube.

Family EUNICIDAE

Eunice pennata (O. F. Müller).
Eunice siciliensis, Grube.
Eunice vittata (Delle Chiaje).
Eunice longicirrata, Webster.
Eunice rousseaui, Quatrefages.
Eunice murrayi, McIntosh.
Nicidion kinbergii, Webster.
Nicidion edentulum, Ehlers.
Diopatra cuprea (Bosc).
Diopatra punctifera, Ehlers.
Epidiopatra hupferiana, Augener.
Rhamphobrachium ehlersi, n.sp.
Onuphis eremita, Audouin and Milne-Edwards.
Onuphis notialis, n.sp.
Onuphis quadricuspis, M. Sars.
Onuphis iridescens (Johnson).
Leptoecia antarctica, n.sp.
Lumbrinereis magalhaensis, Kinberg.
Lumbrinereis africana, Augener.
Lumbrinereis coccinea, Renieri.
Lumbrinereis heteropoda, Marenzeller.
Lumbrinereis tetraura, Schmarda.
Lumbrinereis antarctica, n.sp.
Augeneria tentaculata, gen. et sp. nov.
Arabella iricolor (Montagu).
Drilonereis filum (Claparède).
Drilonereis sp.
Staurocephalus neglectus, Fauvel.
Staurocephalus rubrovittatus, Grube.

Family ARICIIDAE

Aricia marginata, Ehlers.
Aricia michaelseni, Ehlers.
Nainereis hexaphyllum (Schmarda).
Scoloplos mawsoni, Benham.
Scoloplos armiger (O. F. Müller).

Family SPIONIDAE

Pygospio dubia, n.sp.
Nerine sp.
Prionospio africana, Augener.

Family PARAONIDAE

Paraonis (*Paraonides*) *gracilis* (Tauber).

Family CHAETOPTERIDAE

Chaetopterus variopedatus (Renier).
Phyllochaetopterus socialis, Claparède.
Phyllochaetopterus sp.

Family CIRRATULIDAE

Audouinia filigera (Delle Chiaje), var. *capensis* (Schmarda).
Cirratulus cirratus (O. F. Müller).
Cirratulus antarcticus, n.sp.
Cirratulus afer, Ehlers.
Dodecaceria concharum, Oersted.
Heterocirrus caput-esocis, Saint Joseph, var ***capensis***, var. nov.
Tharyx epitoca, n.sp.
Tharyx sp.

Family FLABELLIGERIDAE

Stylarioides kerguelarum (Grube).
Stylarioides swakopianus, Augener.
Flabelligera affinis, M. Sars.
Flabelligera luctator, Stimpson.
Flabelligera pennigera, Ehlers.
Flabelligera mundata, Gravier.
Brada villosa (Rathke).
Brada mammillata, Grube.
Pycnoderma congoense, Grube.

Family SCALIBREGMIDAE

Scalibregma inflatum, Rathke.

Family CAPITELLIDAE

Capitella capitata (Fabricius).
Capitella capitata (Fabricius), var. ***antarctica***, var. nov.
Notomastus latericeus, M. Sars.
Notomastus lineatus, Claparède.

Family OPHELIIDAE

Ammotrypane breviata, Ehlers.
Travisia olens, Ehlers.
Travisia kerguelensis, McIntosh.
Travisia kerguelensis, McIntosh, var. ***gravieri,*** var. nov.
Kesun abyssorum, n.sp.

Family MALDANIDAE

Maldane decorata, Grube.
Maldane sarsi, Malmgren, var. *antarctica*, Arwidsson.
Rhodine intermedia, Arwidsson.
Lumbriclymenella robusta, Arwidsson.
Clymenella minor, Arwidsson.
Clymene kerguelensis (McIntosh).
Clymene (*Isocirrus*) *yungi* (Gravier).
Asychis amphiglypta (Ehlers).
Nicomache lumbricalis (Fabricius).
Nicomache sp.
Axiothella antarctica, n.sp.

Family OWENIIDAE

Owenia fusiformis, Delle Chiaje.

Family SABELLARIIDAE

Gunnarea capensis (Schmarda).
Idanthyrsus armatus, Kinberg.
Idanthyrsus pennatus (Peters).

Family STERNASPIDAE

Sternaspis scutata (Ranzani).
Sternaspis scutata (Ranzani), var. *africana*, Augener.

Family AMPHICTENIDAE

Pectinaria sp.

Family AMPHARETIDAE

Amage sculpta, Ehlers.
Melinna cristata (M. Sars).
Phyllocomus crocea, Grube.
Neosabellides elongatus (Ehlers).
Amphicteis gunneri (M. Sars).
Amphicteis gunneri (M. Sars), var *antarctica*, Hessle
Amphicteis gunneri (M. Sars), var. *japonica*, McIntosh.

Family TEREBELLIDAE

Terebella ehlersi, Gravier.
Loimia medusa (Savigny).
Loimia montagui (Grube).
Pista mirabilis, McIntosh.
Pista corrientis, McIntosh.
Leaena abranchiata, Ehlers, var. *antarctica* (McIntosh).
Leaena collaris, Hessle.
Neoleprea streptochaeta (Ehlers).
Lanice vayssieri (Gravier).
Amphitrite kerguelensis, McIntosh.
Amphitrite edwardsi (Quatrefages).
Nicolea chilensis (Schmarda).
Nicolea macrobranchia (Schmarda).
Artacama proboscidea, Malmgren.
Thelepus cincinnatus (Fabricius).
Thelepus setosus (Quatrefages).
Polycirrus kerguelensis (McIntosh).
Polycirrus hamiltoni, Benham.
Polycirrus hesslei, n.sp.
Lysilla loveni, Malmgren, var. *macintoshi*, Gravier.
Hauchiella tribullata (McIntosh).
Terebellides minutus, Hessle.
Terebellides longicaudatus, Hessle.

Family SABELLIDAE

Sabella pavonina, Savigny.
Potamilla antarctica (Kinberg).
Bispira magalhaensis (Kinberg).
Dasychone violacea (Schmarda).
Dasychone natalensis (Kinberg).
Dasychone nigromaculata (Baird).
Hypsicomus torquatus (Grube).
Euratella puncturata (Augener).
Euchone pallida, Ehlers.
Jasmineira scotti, Benham.

Family SERPULIDAE

Serpula vermicularis, L.
Serpula loveni (Kinberg).
Hydroides norvegica (Gunner).
Vermiliopsis notialis, n.sp.
Vermiliopsis glandigerus, Gravier.
Vermiliopsis richardi, Fauvel, var. ***fauveli***, var. nov.
Salmacina dysteri (Huxley), var. ***falklandica***, var. nov.

Pelagic species

Family POLYNOIDAE

Podarmus atlanticus, n.sp.
Sheila bathypelagica, gen. et sp. nov.
Lagisca hubrechti (McIntosh).
Nectochaeta caroli, Fauvel.
Macellicephala, sp.
Antinoë pelagica, n.sp.

Family PHYLLODOCIDAE

Lopadorhynchus brevis, Grube.

Lopadorhynchus krohnii (Claparède), var. ***simplex***, var. nov.

Family ALCIOPIDAE

Vanadis longissima (Levinsen).
Vanadis formosa, Claparède.
Torrea candida (Delle Chiaje).
Callizona angelini (Kinberg).

Greeffia oahuensis, McIntosh.
Rhynconerella fulgens, Greeff.
Alciopa cantrainii (Delle Chiaje).

Family TOMOPTERIDAE

Tomopteris carpenteri, Quatrefages.
Tomopteris septentrionalis, Quatrefages.
Tomopteris cavallii, Rosa.

Tomopteris nisseni, Rosa.
Tomopteris kempi, n.sp.

Family TYPHLOSCOLECIDAE

Sagitella kowalewskii, Wagner.
Sagitella cornuta, Ehlers.
Sagitella lobifera, Ehlers.

Typhloscolex mülleri, Busch.
Travisiopsis sp.

The total number of benthic species or varieties is 220, belonging to 128 genera, and of pelagic species or varieties 25, belonging to 17 genera.

There are 2 new genera and 29 new species or varieties in this collection, and several additions have been made to the number of species recorded from the colder waters of both hemispheres. I see no reason to doubt the truth of the explanation adopted by Fauvel (1925 *A*, p. 316), Gravier and others of the presence of the same or closely allied species at both poles.

GEOGRAPHICAL DISTRIBUTION

The table on pp. 10–17 is constructed to show where, and at what stations, the species were found; to what extent the Polychaete faunas, as far as they are represented in this collection, diverge or overlap in the several regions (South Georgia and the Falkland Islands, Tristan da Cunha and the Cape, etc.); and how often any two or more species occur at the same stations. Regarding the last, the practice by systematists of presenting their data in some such easily accessible form should prove valuable to the student of animal communities.

The station numbers are not arranged in chronological order, but according to the areas in which they occur, related regions being juxtaposed. A few species are without record of station, and these are omitted from the table.

Each species has a number, which is carried over to the left-hand side of the right-hand pages. The numbers in the columns are station numbers.

	Palmer Archipelago 'Discovery'	S. Shetlands 'Discovery'	Between S. Shetlands and The Horn, 'Discovery'	Between S. Orkneys and S. Shetlands 'Discovery'	Off S. Orkneys 'Discovery'	Between S. Georgia and S. Orkneys, 'Discovery'	South Sandwich Islands	Off Bouvet Island 'Discovery'	Off S. Georgia 'Discovery'
1 *Hermodice carunculata*, var. *didymobranchiata*	—	—	—	—	—	—		—	—
2 *Eurythoë complanata*	—	—	—	—	—	—		—	—
3 *Eurythoë chilensis*	—	—	—	—	—	—		—	—
4 *Chloeia viridis*	—	—	—	—	—	—		—	—
5 *Notopygos megalops*	—	—	—	—	—	—		—	—
6 *Paramphinome australis*	—	—	—	—	167				
7 *Euphrosyne arctia*	—	—	—	—	—	—		—	27 39 42 140
7 ,, ,,									144 149
8 *Aphrodite alta*	181								
9 *Laetmonice producta*	180 181 182	175	—	170	—	160		—	42 45 123 144
9 ,, ,,	186 187								148 149 152
10 *Hermadion ferox*	—	—	—	—	—	—		—	39 42 149
11 *Hermadion magalhaensi*	—	—	—	—	—	—		—	27 140
11 ,, ,,									
12 *Podarmus atlanticus*	—	—	—	—	—	—		—	—
13 *Sheila bathypelagica*	—	—	—	—	—	—		—	—
14 *Lagisca hubrechti*	—	—	—	169	—	—		—	—
15 *Malmgrenia micropoides*	—	—	—	—	—	—		—	—
16 *Nectochaeta caroli*	—	—	—	—	—	—		—	—
17 *Macellicephala* sp.	—	—	—	—	—	—		—	144
18 *Scalisetosus pellucidus*	—	—	—	—	—	—		—	—
19 *Lepidonotus semitectus*	—	—	—	—	—	—		—	—
20 *Eulagisca corrientis*	181 190	—	—	170					
21 *Eunoë opalina*	187								
22 *Eucrantha mollis*	181	—	—	170	—	—		—	159
23 *Polyeunoa laevis*	181 182 187	—	—	170	—	160		—	39 42 144 148
23 ,, ,,	190								149 152 159
23 ,, ,,									
24 *Polynoë antarctica*	181	—	—	—	—	—		—	—
24 ,, ,,									
25 *Harmothoë magellanica*	187 190	195	—	—	—	160		—	27 39 42 45
25 ,, ,,									123 140 144 146
25 ,, ,,									148 149 152 156
25 ,, ,,									159
26 *Harmothoë spinosa*	190	175 177 195	—	—	163 164	160	Only pelagic gear used	—	45 141 145 146
26 ,, ,,									
26 ,, ,,									
26 ,, ,,									
27 *Harmothoë exanthema*	—	—	—	—	—	—		—	—
28 *Harmothoë anderssoni*	—	—	—	—	—	—		—	144
29 *Harmothoë crosetensis*	190	175 195	—	170	—	—		—	—
30 *Harmothoë impar*, var. *notialis*	—	—	—	—	—	—		—	—
31 *Harmothoë kerguelensis*	—	—	—	—	—	—		—	126
32 *Harmothoë cristata*	181 190	195							
33 *Harmothoë curviseta*	181 186								
34 *Antinoë pelagica*	—	—	—	—	—	—		—	18 45
35 *Antinoë setobarba*	—	195							
36 *Antinoë antarctica*	—	—	—	—	—	—		—	29 39 45 123
36 ,, ,,									140 142 149
37 *Antinoë epitoca*	—	—	—	—	—	—		—	—
38 *Eupanthalis tubifex*	—	—	—	—	—	—		—	—
39 *Polyodontes mortenseni*	—	—	—	—	—	—		—	—
40 *Euthalanessa dendrolepis*	—	—	—	—	—	—		—	—
41 *Leanira incisa*	—	—	—	—	—	—		—	—
42 *Eteone sculpta*	—	—	—	—	166	—		—	145
42 ,, ,,									
43 *Eteone aurantiaca*	—	—	—	—	—	—		—	—
44 *Eteone rubella*	—	—	—	—	—	—		—	149
45 *Phyllodoce patagonica*	182	—	—	—	167	160		—	27 45 141 142
45 ,, ,,									144 145
46 *Phyllodoce bowersi*	—	—	—	—	167				
47 *Phyllodoce oculata*	—	—	—	—	—	—		—	—
48 *Phyllodoce longipes*	—	—	—	—	—	—		—	142
49 *Austrophyllum charcoti*	—	195	—	—	—	160		—	45
50 *Genetyllis polyphylla*	190	—	—	—	—	—		—	145
51 *Eulalia magalhaensis*	—	—	—	—	—	—		—	45 141 145
52 *Eulalia viridis*	—	—	—	—	—	—		—	—
53 *Eulalia anomalochaeta*	190	175	—	—	—	—		—	42
54 *Eulalia picta*	—	—	—	—	—	—		—	149 156
55 *Lopadorhynchus brevis*	—	—	—	—	—	—		—	—
56 *Lopadorhynchus krohnii*, var. *simplex*	—	—	—	—	—	—		—	—

	S. Georgia Marine Biological Station	Off S. Georgia 'William Scoresby'	Off Falkland Islands 'Discovery'	N. of Falkland Islands 'William Scoresby'	Between Falkland Islands and The Horn 'Discovery'	Between Falkland Islands and S. America 'William Scoresby'	Between Falkland Islands and Cape Town 'Discovery'	Off Gough Island 'William Scoresby'	Tristan da Cunha 'Discovery'	Off South-west Africa 'Discovery'	Off South-west Africa 'William Scoresby'	South Africa Marine Biological Station	Between Cape Town and Cape Verde Islands 'Discovery'	Ascension Island 'Discovery'
1	—	—	—	—	—	—	—	—	—	—	—	—	279 283	1 2
2	—	—	—	—	—	—	—	—	—	—	—	—	283	
3	—	—	—	—	—	—	—	—	4					
4	—	—	—	—	—	—	—	—	—	—	—	—	283	
5	—	—	—	—	—	—	—	—	—	—	—	—	283	
6														
7	71													
7														
8														
9	—	33												
9														
10														
11	71	—	51 52 53	—	—	73 80 81								
11			57 58			84 85 93								
12	—	—	—	—	—	—	—	—	—	—	—	—	282	
13	—	—	—	—	—	—	256							
14	—	—	—	—	—	—	—	—	—	100	—	—	267	
15	—	—	—	—	—	—	—	—	—	—	—	-	283	
16	—	—	—	—	—	—	—	—	—	—	—	—	273 276	
17														
18	—	—	—	—	—	—	—	—	—	90	—	82		
19	—	—	—	—	—	—	—	—	—	90				
20														
21														
22	—	—	—	—	—	97								
23	—	—	—	—	—	81 82 83								
23						85 86 91								
23						93 97								
24	—	—	51	—	—	73 79 80								
24						81								
25	14 68 71	27	—	109	—	73 76 88								
25						97								
25														
25														
26	6 68 71	25 56 62	48 51 52	—	—	72 73 76								
26			53 55 57			77 79 80								
26			58			84 85 93								
26						97								
27	—	—	53 56 58	—	—	79 88								
28														
29	—	—	—	—	—	—	—	—	—	90				
30	—	—	51											
31														
32														
33														
34														
35														
36	68													
36														
37	—	—	—	—	—	—	—	—	—	—	—	—	274	
38	—	—	—	—	—	—	—	—	—	—	—	—	274	
39	—	—	—	—	—	—	—	—	—	—	—	—	279	
40	—	—	—	—	—	—	—	—	—	—	—	—	283	
41	—	—	—	—	—	—	—	—	—	—	—	—	274 279	
42	—	—	—	—	—	71 84 85								
42						88								
43	—	65												
44														
45	71	—	—	—	—	—	—	—	—	91				
45														
46														
47	—	—	—	—	—	—	—	—	4	—	—	—	283	1
48														
49	68													
50	14													
51	—	25												
52	—	—	—	—	—	—	—	—	—	—	—	—	283	
53														
54	71	—	56 57											
55	—	—	—	—	—	—	—	—	—	—	—	—	273	
56	—	—	—	—	—	—	—	—	—	104	—	—	267 268	

	Palmer Archipelago 'Discovery'	S. Shetlands 'Discovery'	Between S. Shetlands and The Horn, 'Discovery'	Between S. Orkneys and S. Shetlands 'Discovery'	Off S. Orkneys 'Discovery'	Between S. Georgia and S. Orkneys, 'Discovery'	South Sandwich Islands	Off Bouvet Island 'Discovery'	Off S. Georgia 'Discovery'
57 *Vanadis longissima*	—	—	220	—	—	—	—	—	—
58 *Vanadis formosa*	—	—	—	—	—	—	—	—	—
58 ,, ,,									
59 *Torrea candida*	—	—	—	—	—	—	—	—	—
60 *Callizona angelini*	—	—	—	—	—	—	—	—	—
61 *Greeffia oahuensis*	—	—	—	—	—	—	—	—	—
62 *Rhynconerella fulgens*	—	—	—	—	—	—	33 53		
63 *Alciopa cantrainii*	—	—	—	—	—	—	—	—	—
64 *Tomopteris carpenteri*	—	—	—	—	—	—	6 10 12 16	114 118	17 36 37 38
64 ,, ,,							17 19 21 22		41
64 ,, ,,							32 57		
65 *Tomopteris septentrionalis*	—	—	—	—	—	—	6 10 16 17	—	—
65 ,, ,,							19 20 21 24		
65 ,, ,,							32 33 35 44		
65 ,, ,,							56		
66 *Tomopteris cavallii*	—	—	—	—	—	—	—	—	—
67 *Tomopteris nisseni*	—	—	—	—	—	—	—	—	—
67 ,, ,,									
68 *Tomopteris kempi*	—	—	—	—	—	—	—	—	—
69 *Sagitella kowalewskii*	—	—	220	—	—	—	—	116	17
70 *Sagitella cornuta*	—	—	—	—	—	—	—	—	—
71 *Sagitella lobifera*	—	—	—	—	—	—	—	—	—
72 *Typhloscolex mülleri*	—	—	—	—	—	—	53		
73 *Travisiopsis* sp.	—	—	—	—	—	—		—	—
74 *Orseis* sp.	—	—	—	—	—	—		—	—
75 *Leocrates diplognathus*	—	—	—	—	—	—		—	—
76 *Pionosyllis comosa*	—	—	—	—	—	—		—	39
77 *Pionosyllis maxima*	—	—	—	—	—	—		—	45
78 *Eusyllis kerguelensis*	—	—	—	—	—	—		—	39
78 ,, ,,									
79 *Trypanosyllis gigantea*	190	175	—	—	—	160		—	27 45 123 140
79 ,, ,,									145 148 149
80 *Trypanosyllis gemmulifera*	—	—	—	—	—	—		—	—
81 *Autolytus charcoti*	190	—	—	—	—	—		—	45
82 *Autolytus gibber*	—	—	—	170	—	—		—	141
83 *Autolytus simplex*	—	—	—	—	—	—		—	—
84 *Autolytus* sp.	—	—	—	—	—	—		—	135
85 *Grubea clavata*	—	—	—	—	—	—		—	—
86 *Syllis prolixa*	—	—	—	—	—	—		—	45
87 *Syllis brachychaeta*	190	—	—	—	—	—		—	—
88 *Syllis brachycola*	190	—	—	—	—	—		—	—
89 *Syllis variegata*	—	—	—	—	—	—		—	—
90 *Syllis sclerolaema*	—	—	—	—	—	—		—	—
91 *Nereis kerguelensis*	190	175	—	—	163 164	—	Only pelagic gear used	—	45 141 145
92 *Nereis callaona*	—	—	—	—	—	—		—	—
93 *Nereis eugeniae*	—	—	—	—	—	—		—	—
93 ,, ,,									
94 *Nereis typhla*	—	—	—	—	—	—		—	152
95 *Nereis pelagica*	—	—	—	—	—	—		—	—
96 *Platynereis magalhaensis*	—	—	—	—	—	—		—	145
96 ,, ,,									
97 *Platynereis dumerilii*	—	—	—	—	—	—		—	—
98 *Leptonereis loxechini*	182 190	175	—	170	—	—		—	123
98 ,, ,,									
99 *Eunereis hardyi*	—	—	—	—	—	—		—	—
100 *Ceratonereis vittata*	—	—	—	—	—	—		—	—
101 *Nephthys macrura*	180 181 182	173 175 195	—	—	167	160		—	27 28 29 45
101 ,, ,,	186 190								140 143 144 146
101 ,, ,,									148 149 157 159
102 *Nephthys lyrochaeta*	—	—	—	—	—	—		—	—
103 *Nephthys serratifolia*	—	—	—	—	—	—		—	—
104 *Ephesia antarctica*	—	—	—	170	—	—		—	—
105 *Glycera capitata*	190	175 177	—	—	—	160		—	27 42 45 123
105 ,, ,,									144 149 159
106 *Glycera tesselata*	—	—	—	—	—	—		—	—
107 *Glycera convoluta*	—	—	—	—	—	—		—	—
108 *Goniada congoensis*	—	—	—	—	—	—		—	—
109 *Eunice pennata*	—	—	—	—	—	160		—	152 156 157 159
110 *Eunice siciliensis*	—	—	—	—	—	—		—	—
111 *Eunice vittata*	—	—	—	—	—	—		—	—
112 *Eunice longicirrata*	—	—	—	—	—	—		—	—
113 *Eunice murrayi*	—	—	—	—	—	—		—	—
114 *Nicidion kinbergii*	—	—	—	—	—	—		—	—

	S. Georgia Marine Biological Station	Off S. Georgia 'William Scoresby'	Off Falkland Islands 'Discovery'	N. of Falkland Islands 'William Scoresby'	Between Falkland Islands and The Horn 'Discovery'	Between Falkland Islands and S. America 'William Scoresby'	Between Falkland Islands and Cape Town 'Discovery'	Off Gough Island 'William Scoresby'	Tristan da Cunha 'Discovery'	Off South-west Africa 'Discovery'	Off South-west Africa 'William Scoresby'	South Africa Marine Biological Station	Between Cape Town and Cape Verde Islands 'Discovery'	Ascension Island 'Discovery'
57	—	—	—	—	—	—	—	—	—	—	—	—	287 291	
58	—	—	—	—	—	—	85 87 89	—	—	102	—	—	270 282 287	
58							259							
59	—	—	—	—	—	—	—	—	—	102	—	—	294	
60	—	—	—	—	—	—	250 254 257	—	—	—	—	—	268	
61	—	—	—	—	—	—	—	—	—	—	—	—	273 288 289	
62														
63	—	—	—	—	—	—	—	—	—	100	—	—	287 289	
64	11 19 22													
64	25 31 32													
64	34a 62 68													
65	26b	—	—	—	—	—	69							
65														
65														
66	—	—	—	—	—	—	89							
67	—	—	—	—	—	—	78 87 89	—	—	—	—	—	267 282 288	
67													293	
68	—	—	—	—	—	—	—	—	6					
69	—	—	—	—	—	—	78 85 89							
70	—	—	—	—	—	—	258							
71	—	—	—	—	—	—	78 85	—	—	100				
72														
73	—	—	—	—	—	—	—	—	—	100				
74	68													
75	—	—	—	—	—	—	—	—	—	—	—	—	283	
76														
77														
78	—	—	51 53 56	—	—	72								
78			57											
79	68 71	25	—	—	—	80 83 84								
79						86 93 97								
80	—	—	—	—	—	—	—	—	—	—	—	—	—	1
81	14													
82														
83	—	—	53 57	—	—	—	63							
84														
85	—	25												
86	—	—	51 58											
87	—	—	—	—	—	—	—	—	4					
88	—	—	51	—	—	—	—	128						
89	—	—	52 55 58	—	—	88	—	—	—	—	—	—	283	2
90	—	—	51											
91	6 68	25 56 65	51	—	—	71 84 86								
92	—	—	—	—	—	—	—	—	—	90				
93	—	—	51 52 58	—	—	71 79 80								
93						81 84								
94														
95	—	—	—	—	—	—	—	—	4					
96	—	25 65	51 53 55	—	222	75								
96			56 58											
97	—	—	—	—	—	—	—	—	—	90	—	82		
98	—	—	—	—	—	83 93 97	—	—	6					
98						99								
99	—	—	—	—	—	—	86 88	—	—	90 93				
100	—	—	—	—	—	—	—	—	—	—	—	—	283	
101	15 68	25 32 33												
101														
102	—	—	—	—	—	—	—	—	—	—	—	—	279	
103	—	—	51	—	—	79 91								
104														
105	68 71	—	51 55 58	—	—	84 86	—	—	4					
105														
106	—	—	—	—	—	—	—	—	—	—	—	—	283	
107	—	—	—	—	—	—	—	—	4					
108	—	—	—	—	—	—	—	—	—	—	—	—	274	
109	—	—	51	—	—	—	—	—	6					
110	—	—	—	—	—	—	—	—	—	—	—	—	283	
111	—	—	—	—	—	—	—	—	—	—	—	—	283	
112	—	—	—	—	—	—	—	—	—	—	—	—	283	
113	—	—	—	—	—	—	—	—	—	91	—	—		
114	—	—	—	—	—	—	—	—	—	—	—	—	—	1

	Palmer Archipelago 'Discovery'	S. Shetlands 'Discovery'	Between S. Shetlands and The Horn, 'Discovery'	Between S. Orkneys and S. Shetlands 'Discovery'	Off S. Orkneys 'Discovery'	Between S. Georgia and S. Orkneys, 'Discovery'	South Sandwich Islands	Off Bouvet Island 'Discovery'	Off S. Georgia 'Discovery'
115 *Nicidion edentulum*	—	—	—	—	—	—	Only pelagic gear used	—	—
116 *Diopatra cuprea*	—	—	—	—	—	—		—	—
117 *Diopatra punctifera*	—	—	—	—	—	—		—	—
118 *Epidiopatra hupferiana*	—	—	—	—	—	—		—	—
119 *Rhamphobrachium ehlersi*	—	172							
120 *Onuphis eremita*	—	—	—	—	—	—		—	—
121 *Onuphis notialis*	190	175	—	170	—	—		—	152
122 *Onuphis quadricuspis*	—	—	—	—	—	—		—	—
123 *Onuphis iridescens*	—	—	—	—	—	—		—	—
124 *Leptoecia antarctica*	—	177							
125 *Lumbrinereis magalhaensis*	—	195	—	—	167	—		—	27 29 30 39
125 ,, ,,									42 45 123 140
125 ,, ,,									141 144 145 152
125 ,, ,,									159
126 *Lumbrinereis africana*	—	—	—	—	—	—		—	—
127 *Lumbrinereis coccinea*	—	—	—	—	—	—		—	—
128 *Lumbrinereis heteropoda*	—	—	—	—	—	—		—	—
129 *Lumbrinereis tetraura*	—	—	—	—	—	—		—	—
130 *Lumbrinereis antarctica*	182								
131 *Augeneria tentaculata*	187	—	—	—	167				
132 *Arabella iricolor*	—	—	—	—	—	—		—	—
133 *Drilonereis filum*	—	—	—	—	—	—		—	—
134 *Drilonereis* sp.	—	—	—	—	—	—		—	—
135 *Staurocephalus neglectus*	—	—	—	—	—	—		—	—
136 *Staurocephalus rubrovittatus*	—	—	—	—	—	—		—	—
137 *Aricia marginata*	—	—	—	—	—	—		—	45 141 144
138 *Aricia michaelseni*	—	—	—	—	—	—		—	—
139 *Scoloplos mawsoni*	—	—	—	—	—	—		—	29
140 *Scoloplos armiger*	—	—	—	—	—	—		—	—
141 *Pygospio dubia*	—	—	—	—	—	—		—	29
142 *Nerine* sp.	181								
143 *Prionospio africana*	—	—	—	—	—	—		—	—
144 *Paraonis gracilis*	—	—	—	—	—	—		—	29
145 *Chaetopterus variopedatus*	—	—	—	—	—	—		—	—
146 *Phyllochaetopterus socialis*	—	—	—	—	—	—		—	—
147 *Phyllochaetopterus* sp.	—	—	—	—	167	—		—	146
148 *Audouinia filigera*, var. *capensis*	—	—	—	—	—	—		—	—
149 *Cirratulus cirratus*	—	—	—	—	—	—		—	45 145
150 *Cirratulus antarcticus*	—	—	—	—	—	—		—	29 39 45 140
151 *Cirratulus afer*	—	—	—	—	—	—		—	—
152 *Dodecaceria concharum*	—	—	—	—	—	—		—	—
153 *Heterocirrus caput-esocis*, var. *capensis*	—	—	—	—	—	—		—	—
154 *Tharyx epitoca*	181 190								
155 *Tharyx* sp.	—	—	—	—	—	—		—	30
156 *Stylarioides kerguelarum*	—	—	—	—	—	—		—	39 45 141
157 *Stylarioides swakopianus*	—	—	—	—	—	—		—	—
158 *Flabelligera affinis*	—	—	—	—	—	—		—	45 140
159 *Flabelligera luctator*	—	—	—	—	—	—		—	—
160 *Flabelligera pennigera*	—	—	—	—	—	—		—	141 144 145
161 *Flabelligera mundata*	190								
162 *Brada villosa*	—	175	—	—	167				
163 *Brada mammillata*	—	—	—	170					
164 *Pycnoderma congoense*	—	—	—	—	—	—		—	—
165 *Scalibregma inflatum*	—	—	—	—	—	—		—	27 28 148
166 *Capitella capitata*	—	—	—	—	—	—		—	—
167 *Notomastus latericeus*	—	—	—	—	—	—		—	27 159
168 ? *Notomastus lineatus*	—	—	—	—	—	—		—	152
169 *Ammotrypane breviata*	—	—	—	—	167				
170 *Travisia olens*	—	—	—	—	—	—		—	—
171 *Travisia kerguelensis*	—	175	—	170	—	—		—	146 157 159
172 *Travisia kerguelensis*, var. *gravieri*	187 190								
173 *Kesun abyssorum*	—	177							
174 *Maldane decorata*	—	—	—	—	—	—		—	—
175 *Maldane sarsi*, var. *antarctica*	181 182 186	177 195	—	—	—	—		—	123
175 ,, ,,	192								
176 *Rhodine intermedia*	187	—	—	—	—	—		—	27 42 140 141
176 ,, ,,									152
177 *Lumbriclymenella robusta*	—	195	—	—	—	—		—	27 140
178 *Clymenella minor*	—	—	—	—	—	—		—	—
179 *Clymenella kerguelensis*	—	—	—	—	167	—		—	27

	S. Georgia Marine Biological Station	Off S. Georgia 'William Scoresby'	Off Falkland Islands 'Discovery'	N. of Falkland Islands 'William Scoresby'	Between Falkland Islands and The Horn 'Discovery'	Between Falkland Islands and S. America 'William Scoresby'	Between Falkland Islands and Cape Town 'Discovery'	Off Gough Island 'William Scoresby'	Tristan da Cunha 'Discovery'	Off South-west Africa 'Discovery'	Off South-west Africa 'William Scoresby'	South Africa Marine Biological Station	Between Cape Town and Cape Verde Islands 'Discovery'	Ascension Island 'Discovery'
115	—	—	—	—	—	—	—	—	—	—	—	—	283	
116	—	—	—	—	—	—	—	—	—	—	—	—	274	
117	—	—	—	—	—	—	—	—	—	—	4			
118	—	—	—	—	—	—	—	—	—	91				
119														
120	—	—	—	—	—	—	—	—	—	91				
121														
122	—	—	51	—	—	78 95								
123	—	—	—	—	228									
124														
125	68 71	25 65	51											
125														
125														
125														
126	—	—	—	—	—	—	—	—	—	—	—	—	279	
127	—	—	—	—	—	—	—	—	—	—	—	—	283	
128	—	—	—	—	—	—	—	—	4	—	—	—	279	
129	—	—	51 57	—	—	84	—	—	—	90				
130														
131														
132	—	—	51											
133	—	—	—	—	—	—	—	—	—	—	—	—	279	
134	—	—	—	—	—	—	—	—	4					
135	—	—	—	—	—	—	—	—	—	90				
136	—	—	—	—	—	—	—	—	—	—	—	—	283	
137	25	25 62												
138	—	—	56											
139	—	32												
140	—	—	—	—	—	—	—	—	—	90				
141														
142														
143	—	—	—	—	—	—	—	—	—	—	—	—	279	
144														
145	—	—	58	—	222	80 81 88	—	128	—	—	—	—	274	
146	—	—	—	—	—	—	—	—	—	—	—	—	272	
147														
148	—	—	—	—	—	—	—	—	—	90				
149	6 66	25 62	—	—	—	73 97								
150														
151	—	—	—	—	—	—	—	—	—	—	—	—	279	
152	—	—	—	—	—	—	—	—	—	—	—	—	—	2
153	—	—	—	—	—	—	—	—	—	90				
153														
154														
155	68 71													
156														
157	—	—	—	—	—	—	—	—	4					
158	—	—	51 53	—	—	77								
159	—	—	—	—	—	—	—	—	—	90				
160														
161														
162														
163														
164	—	—	—	—	—	—	—	—	—	—	—	—	274	
165	68													
166	67													
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173														
174	—	—	—	—	—	—	—	—	—	—	—	—	274	
175														
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178	—	—	51	—	—	78								
179														

	Palmer Archipelago 'Discovery'	S. Shetlands 'Discovery'	Between S. Shetlands and The Horn, 'Discovery'	Between S. Orkneys and S. Shetlands 'Discovery'	Off S. Orkneys 'Discovery'	Between S. Georgia and S. Orkneys, 'Discovery'	South Sandwich Islands	Off Bouvet Island 'Discovery'	Off S. Georgia 'Discovery'
180 *Clymene yungi*	181 190	177	—	—	—	—		—	27 45 140 148
180 ,, ,,	—	—	—	—	—	—		—	149 152 153
181 *Asychis amphiglypta*	181 186	195	—	—	—	—		—	29 30
182 *Nicomache* sp.	190								
183 *Axiothella antarctica*	—	—	—	—	167	—		—	—
184 *Owenia fusiformis*	—	—	—	—	—	—		—	—
185 *Gunnarea capensis*	—	—	—	—	—	—		—	—
186 *Idanthyrsus armatus*	—	—	—	—	—	—		—	—
186 ,, ,,									
186 ,, ,,									
187 *Idanthyrsus pennatus*	—	—	—	—	—	—		—	—
188 *Sternaspis scutata*	181 182 187	177	—	—	167	—		—	45 145
188 ,, ,,	190								
189 *Sternaspis scutata*, var. *africana*	—	—	—	—	—	—		—	—
190 *Pectinaria* sp.	—	—	—	—	—	—		—	—
191 *Amage sculpta*	—	177	—	—	167				
192 *Melinna cristata*	—	—	—	—	—	—		—	27
193 *Phyllocomus crocea*	—	177	—	—	—	—		—	—
194 *Neosabellides elongatus*	—	—	—	—	—	—		—	140 159
195 *Amphicteis gunneri*	—	—	—	—	—	—		—	—
196 *Amphicteis gunneri*, var. *antarctica*	182	195	—	—	167	160		—	28 30 39 143
196 ,, ,,									152
197 *Amphicteis gunneri*, var. *japonica*	—	—	—	—	—	—		—	—
198 *Terebella ehlersi*	190	—	—	—	—	—		—	45 149
199 *Loimia medusa*	—	—	—	—	—	—		—	—
200 *Loimia montagui*	—	—	—	—	—	—		—	—
201 *Pista mirabilis*	—	—	—	170				—	
202 *Pista corrientis*	—	195	—	—	—	—		—	—
203 *Leaena abranchiata*, var. *antarctica*	—	—	—	—	—	—		—	45
204 *Leaena collaris*	—	—	—	—	—	—		—	45
205 *Neoleprea streptochaeta*	—	—	—	—	—	—		—	45
206 *Lanicides vayssieri*	—	—	—	—	—	—		—	27 45
207 *Amphitrite kerguelensis*	—	195	—	—	—	—		—	27
208 *Amphitrite edwardsi*	—	—	—	—	—	—	Only pelagic gear used	—	—
209 *Nicolea chilensis*	—	—	—	—	—	—		—	—
210 *Nicolea macrobranchia*	—	—	—	—	—	—		—	—
211 *Artacama proboscidea*	—	—	—	—	—	—		—	27 30 144
212 *Thelepus cincinnatus*	187	195	—	—	163	—		—	27 39 42 45
212 ,, ,,									123 140 146 148
212 ,, ,,									149 159
213 *Thelepus setosus*	—	—	—	—	—	—		—	—
214 *Polycirrus kerguelensis*	—	—	—	—	—	—		—	39 42 45 144
214 ,, ,,									148
215 *Polycirrus hamiltoni*	—	—	—	—	—	—		—	—
216 *Polycirrus hesslei*	—	—	—	—	—	—		—	—
217 *Lysilla loveni*, var. *macintoshi*	181	—	—	—	—	—		—	28 30
218 *Hauchiella tribullata*	—	—	—	—	—	—		—	—
219 *Terebellides minutus*	—	—	—	—	—	—		—	30 45
220 *Terebellides longicaudatus*	182	—	—	—	—	—		—	27 30 45
221 *Sabella pavonina*	—	—	—	—	—	—		—	—
222 *Potamilla antarctica*	190	175 195	—	—	—	—		—	39 42 45 123
222 ,, ,,									153 154
223 *Bispira magalhaensis*	—	—	—	—	—	—		—	—
224 *Dasychone violacea*	—	—	—	—	—	—		—	—
225 *Dasychone natalensis*	—	—	—	—	—	—		—	—
226 *Dasychone nigromaculata*	—	—	—	—	—	—		—	—
227 *Hypsicomus torquatus*	—	—	—	—	—	—		—	—
228 *Euratella puncturata*	—	—	—	—	—	—		—	—
229 *Euchone pallida*	—	172 195	—	—	167	—		—	39 45 123
230 *Jasmineira scotti*	—	—	—	—	—	—		—	—
231 *Serpula vermicularis*	190	—	—	—	—	160		—	27 45 140 146
232 *Serpula loveni*	—	—	—	—	—	—		—	—
233 *Hydroides norvegica*	—	—	—	—	—	—		—	—
234 *Vermiliopsis notialis*	—	—	—	—	—	—		—	148
235 *Vermiliopsis glandigerus*	—	—	—	—	—	—		—	—
236 *Vermiliopsis richardi*, var. *fauveli*	—	—	—	—	—	—		—	—
237 *Salmacina dysteri*, var. *falklandica*	—	—	—	—	—	—		—	—

	S. Georgia Marine Biological Station	Off S. Georgia 'William Scoresby'	Off Falkland Islands 'Discovery'	N. of Falkland Islands 'William Scoresby'	Between Falkland Islands and The Horn 'Discovery'	Between Falkland Islands and S. America 'William Scoresby'	Between Falkland Islands and Cape Town 'Discovery'	Off Gough Island 'William Scoresby'	Tristan da Cunha 'Discovery'	Off South-west Africa 'Discovery'	Off South-west Africa 'William Scoresby'	South Africa Marine Biological Station	Between Cape Town and Cape Verde Islands 'Discovery'	Ascension Island 'Discovery'
180														
180														
181	68													
182														
183	—	—	—	—	—	76								
184	—	—	—	—	—	—	—	—	—	—	4			
185	—	—	—	—	—	—	—	—	—	—	—	82		
186	—	—	51 53	—	—	72 77 79								
186						85 88 92								
186						93								
187	—	—	—	—	—	—	—	—	—	—	—	—	—	2
188														
188														
189	—	—	—	—	—	—	—	—	—	—	—	—	274 279	
190	—	—	—	—	—	—	—	—	4					
191														
192														
193	—	—	—	—	—	80								
194														
195	—	—	—	—	—	—	—	—	—	91				
196	15 69	32												
196														
197	—	—	—	—	—	—	—	—	—	—	—	—	279	
198	68													
199	—	—	—	—	—	—	—	—	—	—	—	—	—	1
200	—	—	—	—	—	—	—	—	—	—	—	—	270	
201														
202	—	—	51											
203	68													
203														
204														
205	—	—	51											
206	14 71	25												
207	—	—	—	—	—	99								
208	—	—	—	—	—	80 81 97								
209	—	—	51 58	—	—	84 88	—	—	4					
210	—	—	—	—	—	—	—	—	—	—	—	82		
211	—	25												
212														
212														
212														
213	14 68 71	27	51 53 58	—	—	97								
214	—	25 56 65	—	—	—	73 79 90								
214	—	—	—	—	—	97								
215	—	—	51 52											
216	—	—	—	—	—	73								
217														
218	68													
219	—	62												
220														
221	—	—	—	—	—	—	—	—	—	91				
222	14	—	48 55 58	—	—	73 79 84								
222						85 88 90								
223	—	—	55 58											
224	—	—	—	—	—	—	—	—	—	90				
225	—	—	—	—	—	—	—	—	—	—	—	82		
226	—	—	—	—	—	—	—	—	—	—	—	—	—	1
227	—	—	—	—	—	—	—	—	—	—	—	—	283	
228	—	—	—	—	—	—	—	—	—	—	—	—	—	2
229	68													
230	—	33												
231	71	27	—	—	—	77 79 92								
232	—	—	—	—	—	—	—	128						
233	—	—	—	—	—	—	—	—	—	91				
234														
235	—	—	—	—	—	—	—	—	—	—	—	—	283	
236	—	—	—	—	—	—	—	—	—	—	—	—	283	
237	—	—	—	—	—	85								

BATHYMETRICAL DISTRIBUTION

Benthic species

The following table of benthic species gives the number of hauls and the number of specimens in parallel columns at three categories of depth, 0–175 m., 175–350 m. and below 350 m. The depth of 350 m. is chosen as being Chun's physiological line, below which assimilation by the phytoplankton ceases. It should be borne in mind, however, that the majority of hauls are coastal, and the presence of detritus, etc., in the water at the coastal stations would raise the level of penetration of the sun-rays, necessary for assimilative activity, to above the 350 m. line.

The object of the table is to show, within the limits of the present material, what species are confined to one of the selected categories of depth, and to what extent other species, not so confined, increase or decrease in numbers per haul in passing from one depth to another. Repeated observations of this kind would reveal at what depth a species or group of species was most dense, and consequently their optimum depth. This would vary with the latitude and conditions of temperature.

A number of species have depth records as, for example, 120–200 m., which do not exactly fit the arbitrary categories of depth used; and these I have placed in the categories to which their recorded depths most nearly approximate. A few species are without any record of depth, and these are excluded from Table II.

Table II

Species	0–175 m.		175–350 m.		350–1000 m.	
	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens
Hermodice carunculata, var. *didymobranchiata*	2	16	—	—	—	—
Eurythoë complanata	3	28	—	—	—	—
Eurythoë chilensis	1	1	—	—	—	—
Chloeia viridis	1	1	—	—	—	—
Notopygos megalops	1	1	—	—	—	—
Paramphinome australis	—	—	1	1	—	—
Euphrosyne capensis[1]	1	3	—	—	—	—
Euphrosyne arctia	5	7	2	3	—	—
Aphrodite alta	—	—	1	1	—	—
Laetmonice producta[2]	5	14	10	102	—	—
Hermadion ferox	1	2	2	3	—	—
Hermadion magalhaensi	14	146	—	—	—	—
Malmgrenia micropoides	1	1	—	—	—	—
Euphione elisabethae[3]	—	—	—	—	—	—
Scalisetosus pellucidus	2	3	—	—	—	—
Lepidonotus semitectus	1	5	—	—	—	—
Eulagisca corrientis	1	1	2	3	—	—
Eunoë opalina	—	—	1	1	—	—
Eucrantha mollis	2	2	2	6	—	—
Polyeunoa laevis[4]	13	113	9	40	1	2
Polynoë antarctica	5	8	1	1	—	—
Harmothoë magellanica	13	77	11	99	2	6
Harmothoë spinosa	25	150	6	18	3	3
Harmothoë exanthema	5	18	—	—	—	—
Harmothoë anderssoni	1	1	—	—	—	—
Harmothoë crosetensis	1	4	4	4	—	—
Harmothoë impar, var. *notialis*	1	2	—	—	—	—
Harmothoë kerguelensis	1	1	—	—	—	—
Harmothoë cristata	—	—	3	4	—	—
Harmothoë curviseta	—	—	2	2	—	—
Antinoë setobarba	—	—	—	—	1	1
Antinoë antarctica	2	2	6	37	—	—
Antinoë epitoca	1	1	—	—	—	—
Eupanthalis tubifex	1	1	—	—	—	—
Polyodontes mortenseni	1	1	—	—	—	—
Euthalanessa dendrolepis	1	2	—	—	—	—
Leanira incisa	2	4	—	—	—	—
Eteone sculpta	6	6	1	3	—	—
Eteone aurantiaca	1	1	—	—	—	—

Species	0–175 m.		175–350 m.		350–1000 m.	
	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens
Eteone rubella	—	—	1	1	—	—
Phyllodoce patagonica	7	14	4	6	1	1
Phyllodoce bowersi	—	—	1	1	—	—
Phyllodoce oculata	3	5	—	—	—	—
Phyllodoce longipes[5]	—	—	—	—	—	—
Austrophyllum charcoti	—	—	3	5	1	2
Genetyllis polyphylla	2	3	1	2	—	—
Eulalia magalhaensis	4	7	1	1	—	—
Eulalia viridis	1	10	—	—	—	—
Eulalia anomalochaeta	1	2	3	3	—	—
Eulalia subulifera	1	3	—	—	—	—
Eulalia picta	3	3	2	6	—	—
Orseis sp.	—	—	1	20	—	—
Leocrates diplognathus	1	1	—	—	—	—
Pionosyllis comosa	—	—	1	1	—	—
Pionosyllis maxima	—	—	1	3	—	—
Eusyllis kerguelensis	5	7	1	1	—	—
Trypanosyllis gigantea	14	26	6	7	—	—
Trypanosyllis gemmulifera	1	1	—	—	—	—
Autolytus charcoti	2	2	1	1	—	—
Autolytus gibber	1	3	1	1	—	—
Autolytus simplex	3	20	—	—	—	—
Autolytus sp.	1	1	—	—	—	—
Grubea clavata	1	4	—	—	—	—
Syllis prolixa	2	2	1	1	—	—
Syllis brachychaeta	3	13	—	—	—	—
Syllis brachycola	3	9	—	—	—	—
Syllis variegata	6	18	—	—	—	—
Syllis sclerolaema	1	2	—	—	—	—
Nereis kerguelensis	13	45	3	11	—	—
Nereis callaona	1	1	—	—	—	—
Nereis eugeniae	8	29	—	—	—	—
Nereis typhla	—	—	1	1	—	—
Nereis pelagica	1	3	—	—	—	—
Platynereis magalhaensis	10	31	—	—	—	—
Platynereis dumerilii	2	22	—	—	—	—
Leptonereis loxechini	5	34	5	65	1	1
Nereis (Eunereis) hardyi	4	26	—	—	—	—
Ceratonereis vittata	1	1	—	—	—	—
Nephthys macrura[6]	12	37	12	103	4	15
Nephthys lyrochaeta	1	4	—	—	—	—

[1] Shore coll.
[2] 1 : 10. 278–500 m., i.e. one haul and 10 specimens. This form is used throughout.
[3] 1 : 3. 310–402 m.
[4] 1 : 11. 278–500 m.
[5] 1 : 1. 88–273 m.
[6] 1 : 15. 278–500 m.

Species	0–175 m.		175–350 m.		350–1000 m.	
	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens
Nephthys serratifolia	2	7	1	1	—	—
Ephesia antarctica	—	—	1	4	—	—
Glycera capitata	16	32	6	15	1	1
Glycera tesselata	1	1	—	—	—	—
Glycera convoluta	1	3	—	—	—	—
Goniada congoensis	1	2	—	—	—	—
Eunice pennata	3	112	3	71	1	1
Eunice siciliensis	1	5	—	—	—	—
Eunice vittata	1	15	—	—	—	—
Eunice longicirrata	1	15	—	—	—	—
Eunice rousseaui	1	1	—	—	—	—
Eunice murrayi	1	3	—	—	—	—
Nicidion kinbergii	1	2	—	—	—	—
Nicidion edentulum	1	4	—	—	—	—
Diopatra cuprea	1	18	—	—	—	—
Diopatra punctifera	1	14	—	—	—	—
Epidiopatra hupferiana	1	2	—	—	—	—
Rhamphobrachium ehlersi	—	—	—	—	1	2
Onuphis eremita	1	1	—	—	—	—
Onuphis notialis	—	—	4	12	—	—
Onuphis quadricuspis	3	10	—	—	—	—
Onuphis iridescens	—	—	—	—	1	2
Leptoecia antarctica	—	—	—	—	1	60
Lumbrinereis magalhaensis	14	63	6	28	1	3
Lumbrinereis africana	1	4	—	—	—	—
Lumbrinereis coccinea	1	2	—	—	—	—
Lumbrinereis heteropoda	2	5	—	—	—	—
Lumbrinereis tetraura	4	17	—	—	—	—
Lumbrinereis antarctica[1]	—	—	—	—	—	—
Augeneria tentaculata	—	—	2	15	—	—
Arabella iricolor	1	4	—	—	—	—
Drilonereis filum	1	4	—	—	—	—
Drilonereis sp.	1	2	—	—	—	—
Staurocephalus neglectus	1	1	—	—	—	—
Staurocephalus rubrovittatus	1	1	—	—	—	—
Aricia marginata	5	43	1	70	—	—
Aricia michaelseni	1	1	—	—	—	—
Naineris hexaphyllum	1	2	—	—	—	—
Scoloplos mawsoni	1	8	1	3	—	—
Scoloplos armiger	1	1	—	—	—	—
Pygospio dubia	1	50	—	—	—	—
Nerine sp.	—	—	1	2	—	—
Prionospio africana	1	1	—	—	—	—
Paraonis gracilis	1	10	—	—	—	—
Chaetopterus variopedatus	6	19	—	—	—	—
Phyllochaetopterus sp.	—	—	2	15	1	3
Audouinia filigera, var. *capensis*	1	11	—	—	—	—
Cirratulus cirratus	8	30	1	7	—	—
Cirratulus antarcticus	2	12	2	12	—	—
Cirratulus afer	1	2	—	—	—	—
Dodecaceria concharum	1	1	—	—	—	—
Heterocirrus caput-esocis, var. *capensis*	1	6	—	—	—	—
Tharyx epitoca	1	1	2	2	—	—
Tharyx sp.	1	3	2	12	—	—
Stylarioides kerguelarum	1	65	2	7	—	—
Stylarioides swakopianus	1	4	—	—	—	—
Flabelligera affinis	4	6	1	1	—	—
Flabelligera luctator	1	2	—	—	—	—
Flabelligera pennigera	3	7	—	—	—	—
Flabelligera mundata	1	1	—	—	—	—
Brada villosa	—	—	2	2	—	—
Brada mammillata	—	—	1	3	—	—
Pycnoderma congoense	1	1	—	—	—	—
Scalibregma inflatum	3	5	1	1	—	—
Capitella capitata	1	1	—	—	—	—
Capitella capitata, var. *antarctica*	1	4	—	—	—	—
Notomastus latericeus	2	5	—	—	—	—
Notomastus lineatus	—	—	1	1	—	—
Ammotrypane breviata	—	—	1	9	—	—
Travisia olens	2	3	—	—	—	—
Travisia kerguelensis	1	3	2	6	2	10

Species	0–175 m.		175–350 m.		350–1000 m.	
	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens
Travisia kerguelensis, var. *gravieri*	—	—	2	12	—	—
Kesun abyssorum	—	—	—	—	1	1
Maldane decorata	1	8	—	—	—	—
Maldane sarsi, var. *antarctica*	—	—	3	3	4	33
Rhodine intermedia	3	7	3	12	—	—
Lumbriclymenella robusta	2	2	—	—	1	3
Clymenella minor	2	5	—	—	—	—
Clymene kerguelensis	1	2	1	1	—	—
Clymene yungi	6	12	4	6	1	1
Asychis amphiglypta	1	1	4	101	1	80
Nicomache lumbricalis	1	2	—	—	—	—
Nicomache sp.	1	1	1	3	—	—
Axiothella antarctica	—	—	2	3	—	—
Owenia fusiformis	1	20	—	—	—	—
Gunnarea capensis[2]	1	3	—	—	—	—
Idanthyrsus armatus	9	25	—	—	—	—
Idanthyrsus pennatus	1	4	—	—	—	—
Sternaspis scutata	1	3	6	240	3	83
Sternaspis scutata, var. *africana*	2	15	—	—	—	—
Pectinaria sp.	1	1	—	—	—	—
Amage sculpta	—	—	1	7	1	1
Melinna cristata	1	1	—	—	—	—
Phyllocomus crocea	1	1	1	5	—	—
Neosabellides elongatus	2	2	—	—	—	—
Amphicteis gunneri	1	1	—	—	—	—
Amphicteis gunneri, var. *antarctica*	3	7	7	27	2	6
Amphicteis gunneri, var. *japonica*	1	1	—	—	—	—
Terebella ehlersi	1	2	3	19	—	—
Loimia medusa	1	6	—	—	—	—
Loimia montagui	1	1	1	2	—	—
Pista mirabilis	1	5	—	—	—	—
Pista corrientis	1	1	—	—	1	2
Leaena abranchiata, var. *antarctica*	—	—	2	11	—	—
Leaena collaris	—	—	1	1	—	—
Neoleprea streptochaeta	1	4	1	1	—	—
Lanicides vayssieri	4	10	1	1	—	—
Amphitrite kerguelensis	1	2	1	1	1	1
Amphitrite edwardsi	3	7	—	—	—	—
Nicolea chilensis	5	92	—	—	—	—
Nicolea macrobranchia	1	2	—	—	—	—
Artacama proboscidea	3	11	1	2	—	—
Thelepus cincinnatus	10	78	7	62	1	1
Thelepus setosus	10	24	—	—	—	—
Polycirrus kerguelensis	3	4	2	5	—	—
Polycirrus hamiltoni	2	7	—	—	—	—
Polycirrus hesslei	1	8	—	—	—	—
Lysilla loveni, var. *macintoshi*	1	5	2	4	—	—
Hauchiella tribullata	—	—	1	3	—	—
Terebellides minutus	1	1	2	14	—	—
Terebellides longicaudatus[3]	1	7	2	7	—	—
Sabella pavonina	1	1	—	—	—	—
Potamilla antarctica	15	93	4	20	1	20
Bispira magalhaensis	2	3	—	—	—	—
Dasychone violacea	1	1	—	—	—	—
Dasychone natalensis[4]	1	4	—	—	—	—
Dasychone nigromaculata	1	8	—	—	—	—
Hypsicomus torquatus	1	1	—	—	—	—
Euratella puncturata[2]	1	5	—	—	—	—
Euchone pallida	—	—	5	57	2	2
Jasmineira scotti	1	1	—	—	—	—
Serpula vermicularis	8	96	2	11	1	3
Serpula loveni	1	6	—	—	—	—
Hydroides norvegica	1	1	—	—	—	—
Vermiliopsis notialis	1	2	—	—	—	—
Vermiliopsis glandigerus	1	4	—	—	—	—
Vermiliopsis richardi, var. *fauveli*	1	3	—	—	—	—

[1] 1 : 1. 278–500 m. [2] Shore coll. [3] 1 : 1. 278–500 m. [4] Beach coll.

SUMMARY

The total number of benthic species for which the depth is recorded is 217, and of these only 207 are used in the following analysis, the remainder being incapable of inclusion in the chosen categories. These 207 species were caught in 770 hauls; and if we see how many species, and how many hauls belonging to these species, are confined to any one of the given categories of depth, and, calculating what percentage they constitute of the total number of species and hauls, compare them each with the others, we may be able to form a rough estimate of the relative species density at the various depths. In the following analysis the first three depth columns represent the same categories as those in the preceding table; the fourth column of the analysis, "0–350 m.," represents a combination of the first two columns of the table, i.e. species with representatives both between 0 and 175 m. and between 175 and 350 m.; the fifth column of the analysis, "0–350 m. and below," represents a combination of all three columns of the table, i.e. species with representatives between 0 and 175 m., between 175 and 350 m. and below 350 m.; the sixth column of the analysis, "Between 175–350 m. and below," represents a combination of the second and third columns of Table III and needs no explanation.

TABLE III

	Depth					
	0–175 m.	Between 175–350 m.	Below 350 m.	Between 0–350 m.	Between 0–350 m. and below	Between 175–350 m. and below
No. of species	116	21	5	42	18	5
No. of hauls	216	35	5	210	281	23
Percentage of total number of species	56 %	10 %	2 %	20 %	9 %	2 %
Percentage of total number of hauls	28 %	5 %	0·6 %	27 %	37 %	3 %

It is noteworthy that for almost the same number of hauls (28 per cent. of the total as against 27 per cent.) nearly three-fifths of the total number of species were confined to above the 175 m. line, as against one-fifth with representatives both above and below the 175 m. line.

Pelagic species

In Table IV, opposite, the bathymetrical range of the pelagic species is shown by the arrangement in parallel columns of the minimum and maximum depths at which each species was found. Where there is only one record, this is set down in the minimum depth column.

The sign (–0) after the depth indicates that the net, though fishing for the duration of the station at the recorded depth, was hauled open to the surface. The possibility is, therefore, not excluded that the organisms contained in it were caught during its passage to a higher level.

TABLE IV

	Minimum depth	Maximum depth
Podarmus atlanticus	300 (–0) m.	—
Sheila bathypelagica	850–1100 m.	—
Lagisca hubrechti	450–550 (–0) m.	2500–2000 m.
Nectochaeta caroli	110–0 m.	200–230 (–0) m.
Macellicephala sp.	155–178 m.	—
Antinoë pelagica	50–0 m.	238–270 m.
Lopadorhynchus brevis	200–230 (–0) m.	—
Lopadorhynchus krohnii, var. *simplex*	56 (–0) m.	450–550 (–0) m.
Vanadis longissima	100 (–0) m.	800–1000 (–0) m.
Vanadis formosa	52 m.	2000 (–0) m.
Torrea candida	104 m.	100–150 (–0) m.
Callizona angelini	100–150 (–0) m.	300 (–0) m.
Greeffia oahuensis	125–225 (–0) m.	250 (–0) m.
Rhynconerella fulgens	250–100 m.	—
Alciopa cantrainii	125–225 (–0) m.	800–1000 (–0) m.
Tomopteris carpenteri	0–5 m.	250–100 m.
Tomopteris septentrionalis	10 m.	250–100 m.
Tomopteris cavallii	1000 (–0) m.	—
Tomopteris nisseni	100–120 (–0) m.	1000 (–0) m.
Tomopteris kempi	0–10 m.	—
Sagitella kowalewskii	110–0 m.	2000 (–0) m.
Sagitella cornuta	320–450 m.	—
Sagitella lobifera	1000 (–0) m.	2500–2000 m.
Typhloscolex mülleri	250–100 m.	—
Travisiopsis sp.	2500–2000 m.	—

ECOLOGICAL

Table V, with the number of specimens and the number of hauls of each species arranged in parallel columns under each of the several kinds of bottom, shows within the scope of the present material what species are confined to any one kind of bottom, to what extent other species not so confined display an increase or decrease in numbers per haul in passing from one kind of bottom to another and, consequently, their relative density on the several kinds of bottom. Although the present material forms a wholly insufficient basis for generalisation, repeated observations of this nature should reveal the kind of bottom on which a species or group of species is most dense and, therefore, their optimum bottom. If to this were added a knowledge of their optimum depth, we should possess some of the factors constituting at a given latitude their optimum habitat.

The nature of the bottom is taken from the observations made by the naturalists and recorded in the Station List 1925–1927 (*Discovery Reports*, I, pp. 1–140). For the purposes of the table I have simplified their classification of the bottom deposits: grey or green mud is treated as mud without qualification; "sand, stones and rock" is treated as "sand and stones"; "mud, sand and stones" is treated as "mud and sand," and so on. In the table there are eight categories of bottom deposit used: mud, sand, stones, rock, mud and sand, mud and stones, mud and rock, sand and stones.

The number of species or varieties having a record of the kind of bottom on which they were found is 168.

Table V

Species	Mud		Sand		Stones		Rock		Mud and sand		Mud and stones		Mud and rock		Sand and stones	
	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens
Hermodice carunculata, var. *didymobranchiata*	—	—	—	—	—	—	—	—	1	15	—	—	—	—	—	—
Eurythoë complanata	—	—	1	25	—	—	—	—	—	—	—	—	—	—	—	—
Eurythoë chilensis	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—
Paramphinome australis	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Euphrosyne arctia	3	4	—	—	—	—	—	—	1	1	1	2	1	1	—	—
Aphrodite alta	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Laetmonice producta	8	69	—	—	—	—	2	26	1	2	5	29	—	—	—	—
Hermadion ferox	3	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hermadion magalhaensi	—	—	6	34	—	—	—	—	—	—	1	1	1	1	1	38
Macellicephala sp.	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—
Eulagisca corrientis	1	1	—	—	—	—	1	1	—	—	1	1	—	—	—	—
Eunoë opalina	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eucrantha mollis	1	4	—	—	—	—	2	3	—	—	—	—	—	—	1	1
Polyeunoa laevis	6	31	5	54	—	—	3	4	1	1	4	50	—	—	1	5
Polynoë antarctica	1	1	5	8	—	—	—	—	—	—	—	—	—	—	—	—
Harmothoë magellanica	6	85	3	4	1	6	4	22	1	5	5	32	1	12	2	4
Harmothoë spinosa[1]	2	11	10	23	—	—	1	1	2	6	4	4	—	—	2	8
Harmothoë exanthema	—	—	1	1	—	—	—	—	—	—	—	—	—	—	1	5
Harmothoë anderssoni	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—
Harmothoë crosetensis	—	—	—	—	—	—	1	1	—	—	3	3	—	—	—	—
Harmothoë impar, var. *notialis*	—	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—
Harmothoë kerguelensis	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—
Harmothoë (Barrukia) cristata	1	1	—	—	—	—	—	—	—	—	2	3	—	—	—	—
Harmothoë (Barrukia) curviseta	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Antinoë setobarba	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Antinoë antarctica	5	33	—	—	—	—	—	—	—	—	2	2	—	—	—	—
Antinoë epitoca	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eupanthalis tubifex	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Polyodontes mortenseni	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—
Leanira incisa	1	1	—	—	—	—	—	—	1	3	—	—	—	—	—	—
Eteone sculpta	—	—	2	2	—	—	—	—	—	—	—	—	—	—	2	4
Eteone rubella	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Phyllodoce patagonica	5	9	1	1	—	—	—	—	1	1	1	1	1	4	—	—
Phyllodoce bowersi	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Phyllodoce oculata	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—
Phyllodoce longipes	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Austrophyllum charcoti	1	3	—	—	—	—	—	—	—	—	2	3	—	—	—	—
Genetyllis polyphylla	—	—	—	—	—	—	—	—	—	—	1	2	—	—	—	—
Eulalia magalhaensis	3	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eulalia anomalochaeta	2	3	—	—	—	—	—	—	—	—	2	2	—	—	—	—
Eulalia picta	1	5	—	—	—	—	1	1	—	—	—	—	—	—	—	—
Pionosyllis comosa	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pionosyllis maxima	1	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eusyllis kerguelensis	1	1	2	4	—	—	—	—	—	—	—	—	—	—	—	—
Trypanosyllis gigantea	3	3	3	5	—	—	—	—	1	2	4	4	1	1	3	8
Trypanosyllis gemmulifera	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—
Autolytus charcoti	1	1	—	—	—	—	—	—	—	—	1	1	—	—	—	—
Autolytus gibber	1	3	—	—	—	—	1	1	—	—	—	—	—	—	—	—
Grubea clavata	—	—	—	—	—	—	—	—	1	4	—	—	—	—	—	—
Syllis prolixa	1	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—
Syllis brachychaeta	—	—	—	—	1	4	—	—	—	—	1	8	—	—	—	—
Syllis brachycola	—	—	2	3	—	—	—	—	—	—	1	1	—	—	—	—
Syllis variegata[2]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
Syllis sclerolaema	—	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—
Nereis kerguelensis[3]	2	13	2	2	—	—	—	—	1	3	2	4	—	—	2	2
Nereis eugeniae[4]	—	—	5	26	—	—	—	—	—	—	—	—	—	—	1	1
Nereis typhla	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—
Nereis pelagica	—	—	—	—	1	3	—	—	—	—	—	—	—	—	—	—

[1] Five specimens off derelict hull. [2] Four specimens from a buoy. [3] Eighteen specimens off kelp. [4] Sixteen specimens off kelp.

Species	Mud		Sand		Stones		Rock		Mud and sand		Mud and stones		Mud and rock		Sand and stones	
	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens
Platynereis magalhaensis[1]	—	—	1	3	—	—	—	—	1	2	—	—	—	—	—	—
Leptonereis loxechini	2	15	3	23	—	—	2	36	—	—	2	8	—	—	1	17
Nereis hardyi	—	—	2	10	—	—	—	—	—	—	—	—	—	—	2	16
Nephthys macrura	9	93	—	—	—	—	2	5	3	7	7	28	2	5	1	7*
Nephthys lyrochaeta	—	—	—	—	—	—	—	—	1	4	—	—	—	—	—	—
Nephthys serratifolia	—	—	3	8	—	—	—	—	—	—	—	—	—	—	—	—
Ephesia antarctica	—	—	—	—	—	—	1	4	—	—	—	—	—	—	—	—
Glycera capitata	5	14	3	14	1	1	1	2	1	2	5	6	1	2	1	1
Glycera convoluta	—	—	—	—	1	3	—	—	—	—	—	—	—	—	—	—
Goniada congoensis	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eunice pennata	—	—	1	1	—	—	4	127	—	—	1	55	—	—	1	1*
Eunice murrayi	—	—	1	3	—	—	—	—	—	—	—	—	—	—	—	—
Nicidion kinbergii	—	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—
Diopatra cuprea	1	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Epidiopatra hupferiana	—	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—
Rhamphobrachium ehlersi	—	—	—	—	—	—	1	2	—	—	—	—	—	—	—	—
Onuphis eremita	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—
Onuphis notialis	—	—	—	—	—	—	2	6	—	—	1	2	1	4	—	—
Onuphis quadricuspis	—	—	2	8	—	—	—	—	—	—	—	—	—	—	1	2
Onuphis iridescens[2]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Leptoecia antarctica	—	—	—	—	—	—	—	—	—	—	1	60	—	—	—	—
Lumbrinereis magalhaensis[3]	5	42	1	4	—	—	2	2	2	26	5	11	1	18	—	—
Lumbrinereis africana	—	—	—	—	—	—	—	—	1	4	—	—	—	—	—	—
Lumbrinereis heteropoda	—	—	—	—	1	3	—	—	1	2	—	—	—	—	—	—
Lumbrinereis tetraura	—	—	1	1	—	—	—	—	—	—	—	—	—	—	1	2
Lumbrinereis antarctica	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Augeneria tentaculata	2	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Arabella iricolor	—	—	1	4	—	—	—	—	—	—	—	—	—	—	—	—
Drilonereis filum	—	—	—	—	—	—	—	—	1	4	—	—	—	—	—	—
Drilonereis sp.	—	—	—	—	1	2	—	—	—	—	—	—	—	—	—	—
Aricia marginata	2	84	—	—	—	—	—	—	2	10	—	—	—	—	—	—
Scoloplos mawsoni	1	3	—	—	—	—	—	—	—	—	1	8	—	—	—	—
Pygospio dubia	—	—	—	—	—	—	—	—	—	—	1	50	—	—	—	—
Nerine sp.	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Prionospio africana	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—
Paraonis gracilis	—	—	—	—	—	—	—	—	—	—	1	10	—	—	—	—
Chaetopterus variopedatus	1	1	2	10	—	—	—	—	—	—	—	—	—	—	1	1
Phyllochaetopterus sp.	2	15	—	—	—	—	1	3	—	—	—	—	—	—	—	—
Cirratulus cirratus	1	7	—	—	1	1	—	—	1	9	—	—	—	—	1	1
Cirratulus antarcticus	3	12	—	—	—	—	—	—	—	—	2	12	—	—	—	—
Cirratulus afer	—	—	—	—	—	—	—	—	1	2	—	—	—	—	—	—
Tharyx epitoca	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Tharyx sp.	—	—	—	—	—	—	—	—	—	—	1	4	—	—	—	—
Stylarioides kerguelarum	3	72	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Stylarioides swakopianus	—	—	—	—	1	4	—	—	—	—	—	—	—	—	—	—
Kesun abyssorum	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—
Maldane decorata	1	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Maldane sarsi, var. *antarctica*	4	4	—	—	—	—	—	—	—	—	2	31	—	—	—	—
Rhodine intermedia	3	16	—	—	—	—	1	1	—	—	1	1	1	1	—	—
Lumbriclymenella robusta	—	—	—	—	—	—	—	—	—	—	2	4	1	1	—	—
Clymenella minor[1]	—	—	2	5	—	—	—	—	—	—	—	—	—	—	—	—
Clymene kerguelensis	1	1	—	—	—	—	—	—	—	—	—	—	1	2	—	—
Clymene yungi	3	5	—	—	—	—	2	2	—	—	5	9	1	3	—	—
Asychis amphiglypta	2	37	—	—	—	—	—	—	—	—	3	43	—	—	—	—
Nicomache sp.	—	—	—	—	—	—	—	—	—	—	1	1	1	3	—	—
Axiothella antarctica	1	2	1	1	—	—	—	—	—	—	—	—	—	—	—	—
Idanthyrsus armatus[4]	—	—	4	8	—	—	—	—	—	—	—	—	—	—	3	7
Sternaspis scutata[5]	6	303	—	—	—	—	—	—	1	3	1	3	1	2	—	—
Sternaspis scutata, var. *africana*	1	14	—	—	—	—	—	—	1	1	—	—	—	—	—	—
Pectinaria sp.	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—
Amage sculpta	1	7	—	—	—	—	—	—	1	1	—	—	—	—	—	—
Melinna cristata	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—

[1] Four specimens off kelp.
[2] Two specimens, diatomic ooze.
[3] Two specimens off kelp.
[4] Four specimens from derelict hull.
[5] Fifteen specimens, mud and diatomic ooze.
* Diatomic ooze.

TABLE V (*contd.*)

Species	Mud		Sand		Stones		Rock		Mud and sand		Mud and stones		Mud and rock		Sand and stones	
	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens	Hauls	Specimens
Flabelligera affinis[1]	1	1	2	3	—	—	—	—	—	—	1	2	—	—	—	—
Flabelligera pennigera	1	2	1	1	—	—	—	—	—	—	—	—	—	—	—	—
Flabelligera mundata	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—
Brada villosa	1	1	—	—	—	—	—	—	—	—	1	1	—	—	—	—
Brada mammillata	—	—	—	—	—	—	1	3	—	—	—	—	—	—	—	—
Pycnoderma congoense	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Scalibregma inflatum	1	1	—	—	—	—	—	—	—	—	1	1	1	3	—	—
Capitella capitata, var. *antarctica*[2]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Notomastus latericeus	—	—	—	—	—	—	1	1	—	—	—	—	1	4	—	—
Notomastus lineatus	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—
Ammotrypane breviata	1	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Travisia olens	—	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—
Travisia kerguelensis	—	—	—	—	—	—	3	15	—	—	1	3	—	—	1	1*
Travisia kerguelensis, var. *gravieri*	1	9	—	—	—	—	—	—	—	—	—	—	1	3	—	—
Phyllocomus crocea	—	—	1	1	—	—	—	—	—	—	1	5	—	—	—	—
Neosabellides elongatus	—	—	—	—	—	—	1	1	—	—	1	1	—	—	—	—
Amphicteis gunneri	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—
Amphicteis gunneri, var. *antarctica*	6	22	—	—	—	—	1	2	4	13	—	—	—	—	—	—
Amphicteis gunneri, var. *japonica*	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—
Terebella ehlersi	2	13	—	—	—	—	—	—	—	—	1	2	—	—	—	—
Loimia medusa	—	—	1	6	—	—	—	—	—	—	—	—	—	—	—	—
Pista mirabilis	—	—	—	—	—	—	1	5	—	—	—	—	—	—	—	—
Pista corrientis	—	—	1	1	—	—	—	—	—	—	1	2	—	—	—	—
Leaena abranchiata, var. *antarctica*	1	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Leaena collaris	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Neoleprea streptochaeta	1	1	1	4	—	—	—	—	—	—	—	—	—	—	—	—
Lanicides vayssieri	1	1	—	—	—	—	—	—	1	1	—	—	1	2	—	—
Amphitrite kerguelensis	—	—	1	1	—	—	—	—	—	—	1	1	1	2	—	—
Amphitrite edwardsi	—	—	1	1	—	—	—	—	—	—	—	—	—	—	1	4
Nicolea chilensis	—	—	1	2	1	52	—	—	—	—	—	—	—	—	2	18
Artacama proboscidea	—	—	—	—	—	—	—	—	2	2	1	2	1	9	—	—
Thelepus cincinnatus	6	69	1	2	1	2	2	19	—	—	3	11	1	20	—	—
Thelepus setosus[3]	—	—	4	9	—	—	—	—	1	1	—	—	—	—	1	1
Polycirrus kerguelensis	3	7	—	—	—	—	—	—	1	1	1	1	—	—	—	—
Polycirrus hamiltoni	—	—	1	4	—	—	—	—	—	—	—	—	—	—	—	—
Polycirrus hesslei	—	—	1	8	—	—	—	—	—	—	—	—	—	—	—	—
Lysilla loveni, var. *macintoshi*	2	6	—	—	—	—	—	—	—	—	1	3	—	—	—	—
Terebellides minutus	1	8	—	—	—	—	—	—	—	—	1	6	—	—	—	—
Terebellides longicaudatus	2	4	—	—	—	—	—	—	—	—	1	4	1	7	—	—
Sabella pavonina	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—
Potamilla antarctica	5	24	5	12	—	—	1	1	—	—	4	32	—	—	2	4
Dasychone nigromaculata	—	—	1	8	—	—	—	—	—	—	—	—	—	—	—	—
Euratella puncturata[4]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Euchone pallida	4	55	—	—	—	—	1	1	—	—	1	1	—	—	—	—
Jasminiera scotti	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—
Serpula vermicularis	1	1	—	—	3	40	1	3	—	—	3	15	1	40	—	—
Hydroides norvegica	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—
Vermiliopsis notialis	—	—	—	—	—	—	—	—	—	—	1	2	—	—	—	—

[1] Two specimens from derelict hull. [2] Four specimens off kelp. [3] Nine specimens off kelp, two off derelict hull. [4] Five specimens from a buoy. * Diatomic ooze.

SUMMARY

The following analysis shows what percentage of the total number of species occurring on all bottoms the species confined to any one of the several kinds of bottom constitute; and also in how many of the total number of hauls on all bottoms the species so confined were caught. It should, however, be borne in mind that many of the species occur on more than one kind of bottom and are, therefore, not included.

	Mud	Sand	Stones	Rock	Mud and sand	Mud and stones	Mud and rock	Sand and stones
Ratio of hauls appertaining to species occurring on only one kind of bottom to total number of hauls on all bottoms (%)	6	$3\frac{1}{2}$	1	1	2	$1\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{5}$
Ratio of species occurring on only one kind of bottom to total number of species occurring on all kinds of bottom (%)	$15\frac{1}{2}$	11	$3\frac{1}{2}$	3	$6\frac{1}{2}$	$5\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$

ANIMAL ASSOCIATIONS

Examples of the following species were found living in association with other animals:

Trypanosyllis gigantea, *Autolytus charcoti*, *Syllis brachycola* and *Syllis brachychaeta* inside a colony of *Cephalodiscus nigrescens*, living in the tubules of the polypides.

Nereis kerguelensis and *Polyeunoa laevis* in association with an Alcyonarian.

Hermadion magalhaensi and *Harmothoë spinosa* from a Tubularian colony.

Platynereis magalhaensis from the carapace of a *Paralomis*.

Idanthyrsus armatus found attached to large Molgulidae.

Hermadion magalhaensi from a *Chaetopterus* tube.

SYSTEMATIC ACCOUNT

Family AMPHINOMIDAE

Genus **Hermodice**, Kinberg

Hermodice caruncalata (Pallas) var. **didymobranchiata** (Baird).

Fauvel, 1914, pp. 113–116, pl. viii, figs. 22–27, 31–32.
Amphinome didymobranchiata, Baird, 1864, pp. 449–450, pl. xlv, figs. 1–7.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo. From 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. 58–67 m. Gear **OTL**. Bottom: mud and fine sand. Fifteen specimens.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. One young specimen.

Remarks. The largest specimen measures 42 mm. by 6 mm. including the feet, the smallest, the example from St. 283, only 11 mm. by 2 mm. The great majority have lost all their colour in spirit, but in two or three specimens there remain thin dark intersegmental bands on the back. The caruncle reaches back to the 4th chaetiger, and ventrally the first four chaetigers are involved with the mouth. The two branches of the gill are widely separated; the harpoon-shaped dorsal chaetae are few in number and difficult to find.

These specimens correspond closely to those described by Fauvel (*loc. cit.*) from St Thomas Island, Gulf of Guinea. Fauvel regards Baird's *Amphinome didymobranchiata* from Ascension Island as a variety of the widely distributed *Hermodice carunculata*.

The chief differences between Baird's species and a typical *H. carunculata* are as follows: in Baird's species the gill is more ramified, and the two branches are widely separated; the dorsal chaetae are longer, finer and softer than in *H. carunculata*, and the harpoon-shaped notopodial chaetae are comparatively few in number. There is nothing I can add to Fauvel's careful comparative study of the two forms.

Genus **Eurythoë**, Kinberg

Eurythoë complanata (Pallas).

Eurythoë alcyonia, Gravier, 1901, pp. 248–254, pl. ix, figs. 140–143; pl. x, figs. 144–146.

St. 1. 16. xi. 25. Clarence Bay, Ascension Island. 7° 55′ 15″ S, 14° 25′ 00″ W. 16–27 m. Gear **NRM**. Bottom: coral sand and shell. Twenty-five specimens.

St. 2. 17. xi. 25. Clarence Bay, Ascension Island, Catherine's Point and Collyer Point. Shore collection, on buoy lifted from an inshore position near landing place. Two specimens.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. One young specimen.

Remarks. Of these specimens of Pallas' widely distributed species the largest measures 30 mm. by 4 mm., and the smallest 11 mm. by 2 mm. including the feet. They are at once distinguished from Fauvel's *Eurythoë laevisetis* from St Thomas Island, Gulf of Guinea, by the presence of harpoon-shaped chaetae in the dorsal branch of the foot. *E. complanata* has already been recorded from Annobon by Augener (1918, p. 88). Gravier's account of this species (as *E. alcyonia*) is probably the most complete.

Eurythoë chilensis, Kinberg.

Kinberg, 1857, pp. 35–36, pl. xii, fig. 9.

St. 4. 30. i. 26. Tristan da Cunha. 36° 55′ 00″ S, 12° 12′ 00″ W. 40–46 m. Gear **DL**. Bottom: stones. One specimen.

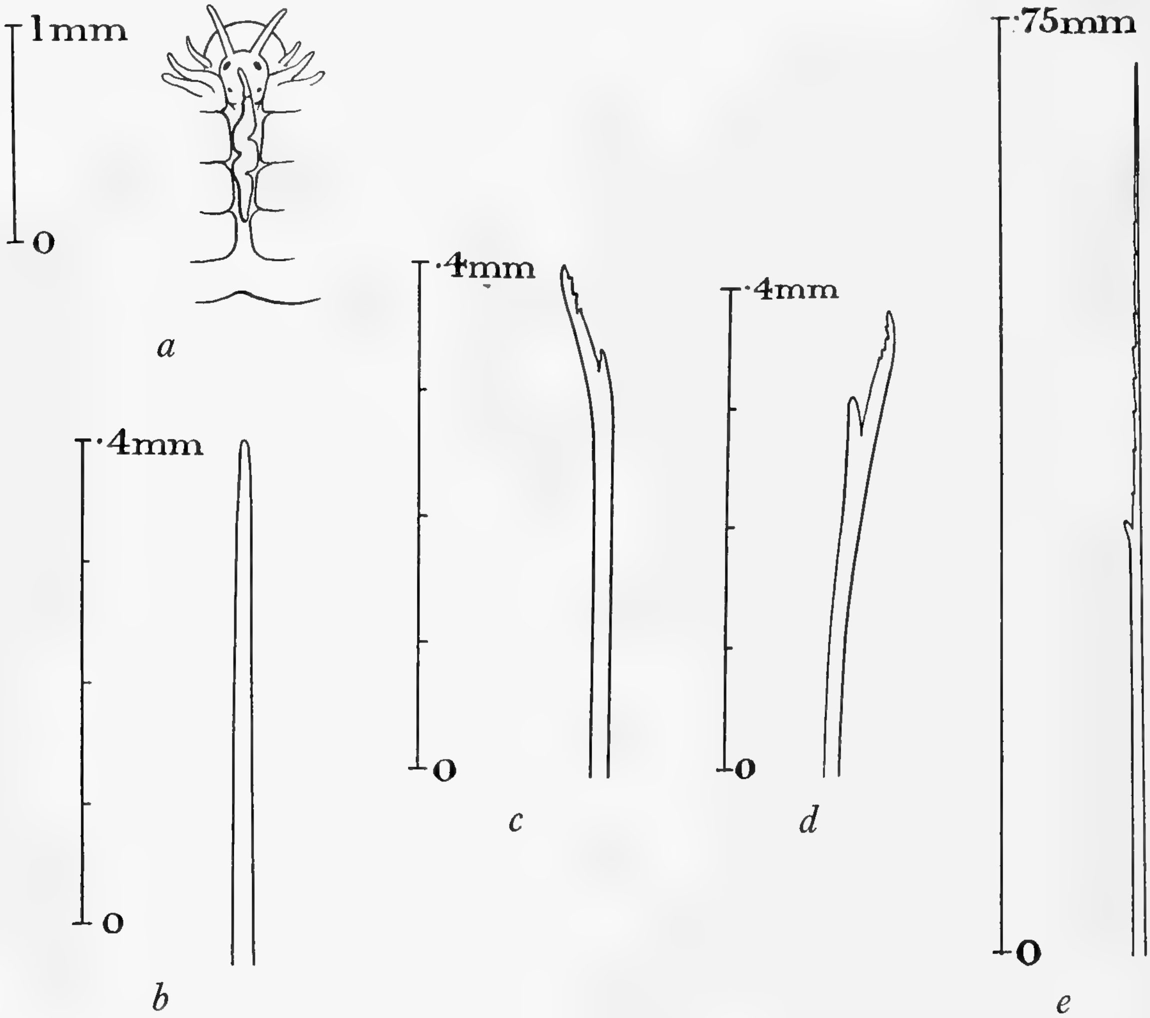


Fig. 1. *Eurythoë chilensis*.

a. Anterior end seen from above. *b*. Smooth type of dorsal bristle. *c*. Toothed type of dorsal bristle. *d*. Ventral bristle. *e*. Capillary ventral bristle.

Description. This specimen measures 10 mm. by 4 mm. including the feet. The colour in spirit is a pale yellow with white bristles, and the body is somewhat flattened dorso-ventrally. The prostomium (Fig. 1, *a*) is semilunar in front with a more or less

quadrangular cushion behind. A pair of lateral tentacles is set far forward on this cushion, and behind them is the anterior pair of red reniform eyes. The posterior pair of minute round eye-spots is set at the back of the prostomial cushion, in such a manner that the two pairs of eyes are at the corners of a square. The small median tentacle is also set far back on the prostomial cushion just in front of the origin of the caruncle, which is a flexuous crest reaching to the 4th chaetiger. There is a pair of palps on the sides of the buccal lobe. The first three chaetigers are involved with the mouth. The gills are small, consisting of four or five digitiform processes; they begin on the 2nd chaetiger.

The feet are set widely apart, and the bristles are few. There is a dorsal cirrus articulated at its base and longer than the branchial processes; and a short ventral cirrus. The dorsal bristles are of four kinds: (1) toothed harpoon-chaetae similar to those figured by Kinberg (Fig. 9, *G*, *s'*), (2) straight, smooth chaetae (Fig. 1, *b*) similar in outline to the harpoon-chaetae, (3) bristles of moderate length with a lateral tooth and a number of widely spaced serrations going to the tip (Fig. 1, *c*), (4) a few (two or three) very long and fine capillary bristles with a lateral spur, finely hispid to the tip, and similar to that figured by Kinberg (Fig. 9, *G*, *s*). In some the lateral spur is more pronounced than that in Kinberg's figure.

The ventral chaetae are of two sorts: (1) numerous bristles of moderate length with a lateral tooth and a number of serrations reaching to the tip (Fig. 1, *d*), (2) one or two very fine and long capillary bristles with a lateral tooth and finely serrated to the tip (Fig. 1, *e*); these bristles are either absent or lost from a large percentage of the neuropodia. There is a lobular pygidium.

REMARKS. My specimen agrees closely and in detail with Kinberg's description and figures except in the following details. Kinberg's figure (9, *B*) of the head shows the median tentacle and the caruncle set further forward on the prostomial pad than they are in my example, but this is corrected in his second figure (9, *B''*) of the head seen from in front. His two figures do not agree. Moreover, the caruncle reaches back to the 4th chaetiger in my specimen, and not to the 3rd, as in Kinberg's figure. He describes it however as "segmentum quintum attingens." Kinberg appears also to have overlooked the smooth type of straight dorsal chaeta, but unless the absence of teeth be noted, these might easily be confused with the harpoon-chaetae, which they closely resemble in outline.

The posterior end of my specimen is slightly damaged, but, as far as I can see, the pygidium is a rounded lobe rather than the large plate shown in Kinberg's figure (9, *x*). Horst (1912, p. 36) wrongly attributes a number of specimens from the Malay Archipelago to this species under a misapprehension of the characters of *E. chilensis*. Kinberg's figure 9, *G*, *s''* represents the shorter type of dorsal bristle with the lateral tooth and serrated tip, and Horst writes, "The setae of our worms show a great resemblance to those of *E. chilensis* figured by Kinberg on Pl. xii, figs. 9, *G*, *u*, *s''*, *s'* and *s*; however, I suggest that a mistake has crept into this delineation and that *s''* should be *u* and also

represents another kind of ventral bristle, for I never met with a dorsal bristle of this shape in the *Eurythoë*-species."

I am not aware that *E. chilensis* has been recorded since Kinberg's original description of an example from off Valparaiso. The common southern American form is *E. paupera*, Grube. It seems probable that *E. chilensis* is a southern cold water species carried north by the cold current, which might account for its occurrence in places as far apart as Valparaiso and Tristan da Cunha.

Genus **Chloeia**, Savigny

Chloeia viridis, Schmarda.

Schmarda, 1861, p. 144, pl. xxxv, figs. 295–305; Augener, 1925, p. 20.
Chloeia euglochis, Ehlers, 1887, pp. 18–24, pl. i, figs. 1 and 2; pl. ii, figs. 1–8; pl. iii, figs. 1–4.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. One specimen.

REMARKS. The single example of this species measures 32 mm. by 6 mm. excluding the feet. The segmental T-shaped markings consist of slender rather faded lines in place of the usual broad stripes. There are 28 chaetigers and the caruncle extends to the anterior edge of the 6th.

This specimen is similar to those described by Augener (1918, p. 94) as *Chloeia euglochis*, Ehlers from Goree Island, off Senegal. An examination of Schmarda's type has convinced Augener (1925, p. 20) that *C. euglochis* is synonymous with *C. viridis*, and I believe that *Chloeia parva*, Baird is also indistinguishable.

Genus **Notopygos**, Grube

Notopygos megalops, McIntosh.

McIntosh, 1885, p. 17, pl. i, fig. 1; pl. ii A, figs. 3 and 4.
Fauvel, 1923, p. 133, fig. 48 *i–n*.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. One specimen.

REMARKS. A single specimen, measuring 14 mm. by 3 mm. including the feet, and having 17 chaetigers. It is colourless except for the large black eyes. The caruncle reaches back to the 5th chaetiger and the branchiae begin on the 7th. The first three chaetigers are involved with the mouth. The chaetae are much damaged, but as far as can be seen they agree with McIntosh's and Fauvel's figures. The anus opens on the dorsal surface of the terminal segment between the pygidial styles. The regular segmental folding of the skin to form a sort of pattern on the back, which is apparent in McIntosh's type, is well shown in this specimen. This is the first record of this species from the African coast; it has previously been found at Bermuda and off the coast of Spain.

I think it probable that this species will prove to be the young form of *Notopygos crinita*, Grube from Ascension Island. As far as our present knowledge goes, the

differences appear to be as follows: *N. megalops* is a much smaller form than *N. crinita*, measuring only 10–15 mm. in length and having 17–19 chaetigers, whereas *N. crinita* is recorded with a length of over 40 mm. and with 28 segments. In *N. megalops* the eyes are larger than in *N. crinita*, the gills are much smaller and begin further back on the body. Moreover, the anus opens on the last segment and not further forward as in *N. crinita*. This position of the anus is characteristic of young examples of *Notopygos*, and has no specific differential value, but it strengthens the presumption that in *N. megalops* we are dealing with a young form.

Genus **Amphinome**, Bruguières

Amphinome vagans (Savigny).

For synonymy see Chamberlin, 1919, p. 27.

29. x. 25. 11° 12′ N, 18° 30′ W. Found on floating cuttle-bone in company with *Lepas* and small gastropods. Twenty-five specimens.

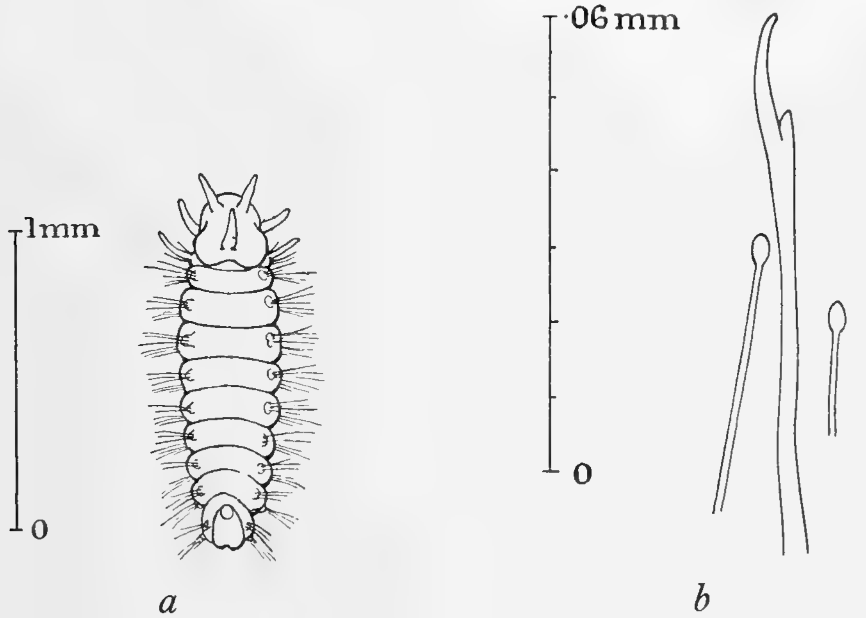


Fig. 2. *Amphinome vagans*.
a. Larva. *b*. Ventral bristles of Larva.

Remarks. Of the 25 specimens more than half are larvae: the largest example measures 8 mm. by 2 mm. including the feet, and the smaller of the larvae are about 1·25 mm. by ·5 mm. including the feet. The more mature of the specimens are typical except that the straight type of dorsal chaetae with denticulated edges is very scarce, and the denticulation so fine that it can only be seen under a high power.

This species is usually found on floating logs, etc., in conjunction with *Lepas*. The younger larvae (Fig. 2, *a*) have about 10 chaetigers, the gills are not yet developed, and the caruncle is not clearly differentiated. I cannot distinguish any eyes. There are five head appendages which are presumably homologous with those of the adult

form. The dorsal and ventral cirri are small and papilliform, except the tentaculiform dorsal cirrus of the 1st chaetiger. I can distinguish no straight denticulated chaetae in the upper ramus of the foot, and the bristles of the lower ramus (Fig. 2, *b*) have a secondary tooth, absent in the adult. There is a large prominent anus on the dorsal surface of the last segment.

By the time a length of 2 mm. is reached with 12 chaetigers, two and three branched gills are developed.

Genus **Paramphinome**, M. Sars

Paramphinome australis, n.sp.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear N 4–T. Bottom: green mud. One specimen.

DESCRIPTION. Length 46 mm., breadth 4 mm. anteriorly and 2 mm. at the posterior end, both measurements excluding the feet. Colour in spirit a very pale yellow. The body is long and vermiform and flattened dorso-ventrally: behind the gill region the intersegmental constrictions are very marked giving the body a moniliform appearance. The head is rounded in front and sends a roughly cordiform prolongation backwards to the posterior border of the 1st chaetiger which at the sides extends forward as far as the base of the palps. There are no eyes. A pair of small lateral tentacles is situated on either side of the front of the prostomium and there is a median tentacle at the same level as the dorsal cirrus of the 1st chaetiger. Below and to the side of the lateral tentacles is a pair of small tapering palps. The dorsal cirrus of the 1st chaetiger is twice as long as the head appendages and slightly longer than the ventral cirrus.

There are 13 pairs of gills and they begin on the 4th chaetiger. They are arborescent and richly branched (Fig. 3, *a*) and grow out of the back just behind the notopodial lobe. From the 7th to the 15th chaetiger they almost meet in the mid-dorsal line.

The two fairly prominent lobes of the feet are widely separated (Fig. 3, *b*) the notopodium being actually dorsal and the neuropodium ventro-lateral. Except for the 1st chaetiger the cirri are very small and almost rudimentary; the dorsal cirrus is just behind the notopodial lobe and the ventral below the neuropodium.

On the 1st chaetiger below the dorsal cirri on either side is a pair of large curved chitinous hooks. These can be seen under a dissecting microscope, and a wish to preserve the single type specimen as intact as possible prevents me from removing them for detailed study.

The bristles of the feet are exceedingly fragile and so much damaged that they render a satisfactory study of them very difficult. In the dorsal lobe there are two kinds of bristles: (1) short moderately stout smooth spear-like bristles (Fig. 3, *c*), and (2) a few very fine capillary bristles proximally smooth and distally delicately serrated on one side (Fig. 3, *d*). In the ventral lobe the bristles are of three kinds: (1) a large number of extremely delicate capillary chaetae in which the lower part is smooth and the upper finely denticulated on one side only (Fig. 3, *e*); (2) near the ventral cirrus are a few knife-shaped short bristles with a small spur and a row of teeth reaching to the tip

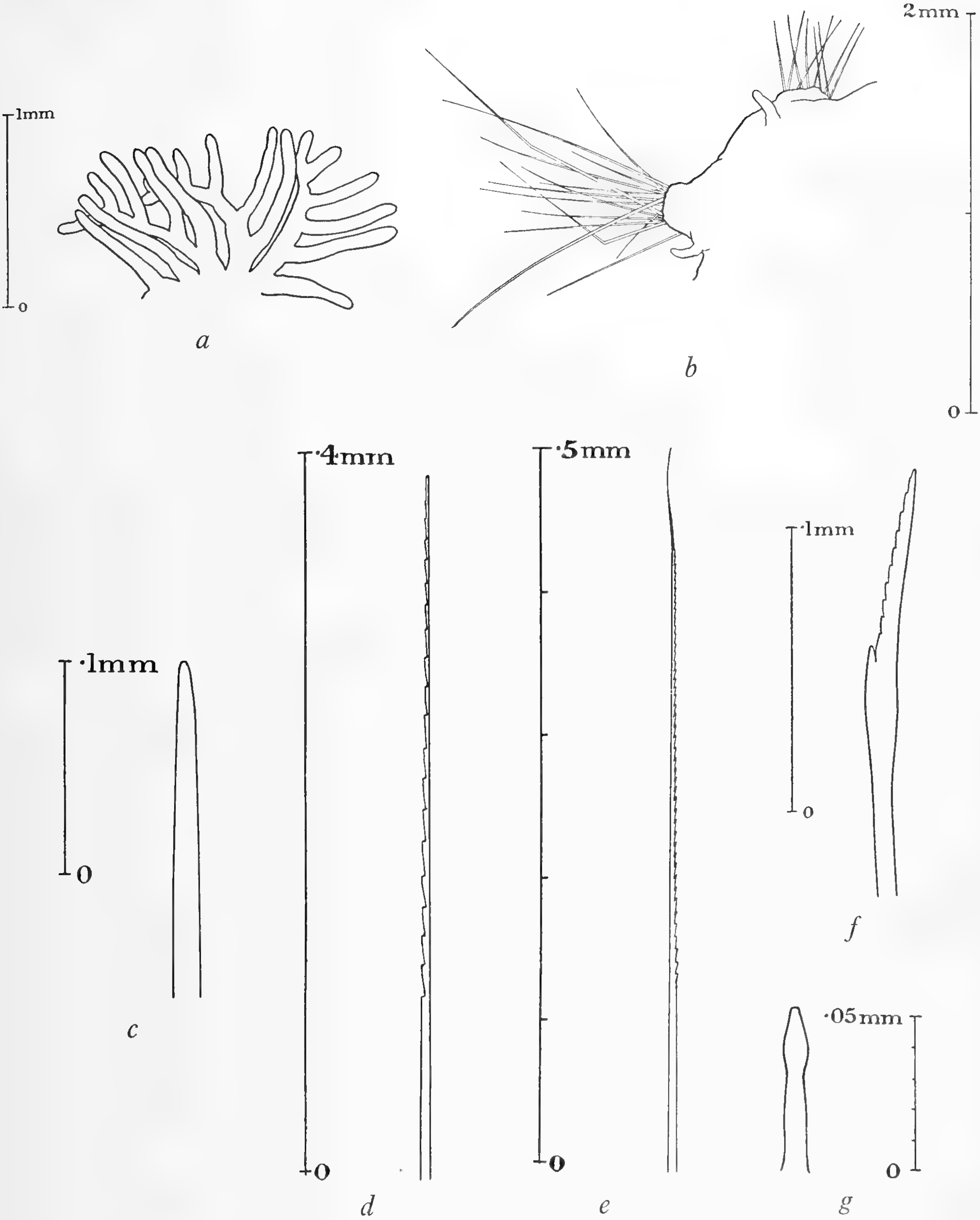


Fig. 3. *Paramphinome australis.*

a. Gill. *b.* Middle foot. *c.* Dorsal bristle. *d.* Dorsal bristle. *e.* Ventral bristle. *f.* Ventral bristle. *g.* Ventral bristle.

(Fig. 3, *f*); (3) a few short stout acicular chaetae with expanded tips (Fig. 3, *g*). The anus opens on the ventral surface of the last segment.

REMARKS. I believe this to be the first record of this genus in southern waters. It differs from *Paramphinome pulchella*, M. Sars, of which an excellent account is given by G. O. Sars (*Remarkable forms of animal life*, vol. 1, pp. 45–49, pl. iv, figs. 19–35), in many particulars, amongst others in the number of gill-pairs.

According to G. O. Sars the fine capillary ventral chaetae (Fig. 34, *c*) in his *P. pulchella* have a lateral spur at the base of the serrations. I cannot find this in my Antarctic specimen, but in some of the bristles the lowest tooth appears to project more than the rest. It is possible that in the damaged condition of the bristles in my example the lateral spur may have worn away, or be broken off.

Genus **Euphrosyne**, Savigny

Euphrosyne capensis, Kinberg.

Kinberg, 1857, p. 37, pl. xii, fig. 14.
McIntosh, 1885, pp. 1–5, pl. ii, fig. 5; pl. i A, figs. 1–3.

24. vii. 26. Salamander Beach, Saldanha Bay, South Africa. Shore collection. Three specimens.

REMARKS. The largest example measures 28 mm. by 8 mm. including the feet. The body is composed of 50–55 chaetigers and the slender caruncle reaches to the 7th chaetiger. The first four chaetigers are involved with the mouth. There are 10–11 branchial trunks, much branched and ending in leaf-shaped tips, and the lower dorsal cirrus is situated between the 2nd and 3rd most dorsal tufts. The chaetae are well figured by McIntosh. This species is very common around the Cape.

Euphrosyne arctia, Johnson.

Johnson, 1897, p. 159, pl. v, figs. 5–7.
? *Euphrosyne armadilloides*, Ehlers, 1901, p. 37, pl. i, figs. 6–8.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. One specimen.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **N 4–T**. Bottom: grey mud. One specimen.

St. 42. 1. iv. 26. Off mouth of Cumberland Bay, South Georgia. From 6·3 miles N 89° E of Jason Light to 4 miles N 39° E of Jason Light. 120–204 m. Gear **OTL**. Bottom: mud. One specimen.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. Two specimens.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **N 4–T**. Bottom: green mud and sand. One specimen.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N $76\frac{1}{2}$° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. Two specimens.

St. MS 71. 9. iii. 26. East Cumberland Bay. $9\frac{1}{4}$ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **BTS** and **NCS–T**. Two specimens.

The larger specimens measure about 11 mm. by 8 mm. including the feet, and the smaller about 5 mm. by 3 mm. The number of chaetigers is between 17 and 21. The body is oval and rather squat, and the colour in spirit is a pale yellow with white bristles. The median tentacle is short and thick. The posterior eyes are large and the anterior are

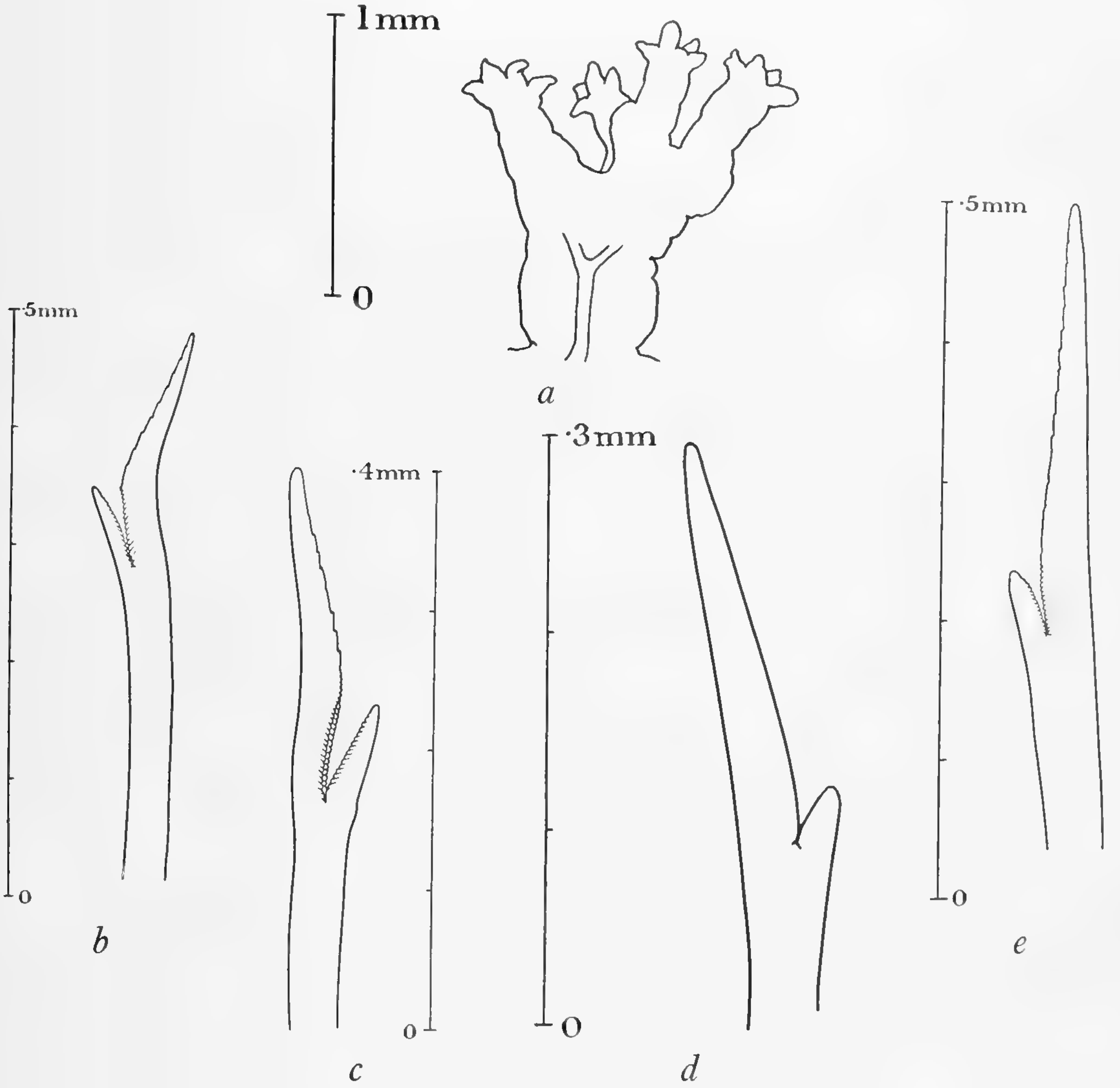


Fig. 4. *Euphrosyne arctia*.

a. Gill. *b*. "Ringent" bristle. *c*. "Ringent" bristle. *d*. Smooth dorsal bristle. *e*. Intermediate dorsal bristle.

partly hidden behind the front of the buccal folds: the mouth reaches to the anterior border of the 5th chaetiger. The caruncle is high, and apparently composed of a single lobe superficially divided by longitudinal grooves running along both sides; it reaches to the anterior border of the 6th chaetiger.

The branchiae begin on the 1st chaetiger and are arranged in transverse rows of five trunks on either side. These trunks (Fig. 4, *a*) branch four times and end in curious

tufts exactly as figured by Johnson (*loc. cit.* Fig. 5). The upper of the two dorsal cirri are on the inside of the rows of gills, and the lower between the 2nd and 3rd most dorsal trunks. The ventral cirri lie behind the ventral bristle-bundles.

The dorsal bristles are of two and perhaps of three kinds: (1) ringent chaetae (Figs. 4, *b* and 4, *c*) which vary in the extent to which the long arm is flexed; (2) smooth stout bifid bristles (Fig. 4, *d*); (3) a few bristles intermediate in type between the "ringents" and the smooth "bifids" (Fig. 4, *e*): in these there are striae in the fork, and the small arm is relatively shorter than in the ringents. In the majority of examples but not in all, the long arm of the "ringent" and the "intermediate" chaetae is delicately serrated to just below the tip. These serrations vary widely in their distinctness in the different specimens, and in a few they cannot be seen. This may be a function of the state of preservation of the bristles.

The ventral chaetae are simple bifids of two sizes exactly as figured by Johnson. The anus is large and ventrally placed.

REMARKS. These Antarctic specimens agree in detail with Johnson's description of an example from 100 fathoms depth in Monterey Bay, California, except that Johnson figures no serrations on the long arm of the ringent chaetae; these may have been absent, as they are in several of the Antarctic specimens. Moreover, he makes no mention of the "intermediate" type of chaetae: they are not clearly separable from the "ringents," and might easily be overlooked.

I am unable to decide whether this species, to which I believe the Antarctic specimens to belong in spite of the wide differences in locality and habitat between them and Johnson's type, is the same as *E. armadilloides*, Ehlers, which has a wide Antarctic distribution. Ehlers is of the opinion that his species is close to both *E. arctia*, Johnson and *E. armadillo*, M. Sars. Now Ehlers' *E. armadilloides* has broad foliaceous tips to its branchiae and a secondary tooth to the long arm of the bifid chaetae: I cannot quite reconcile the curious tufted gill-ends described by Johnson with those of *E. armadilloides*. M. Sars describes *E. armadillo* as having branchiae "apicibus ramulorum conico-acuminatis." This conveys a different type of branchia from that figured by Ehlers for *E. armadilloides*, and the *E. armadillo*, M. Sars of McIntosh (1900, Pl. xxv, fig. 2) and of Fauvel (1923, fig. 49, *O*) has long finger-shaped branchial extremities. As far as the branchiae go, *E. armadilloides* is nearer to *E. foliosa* than to *E. armadillo*.

Moore (1908, p. 340) hesitatingly attributes a specimen from Behm Canal, Alaska, to Johnson's species.

Family APHRODITIDAE

Genus **Aphrodite**, Linnaeus

Aphrodite alta, Kinberg.

Kinberg, 1857, p. 2, pl. i, fig. 1, *a–g*.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. One specimen.

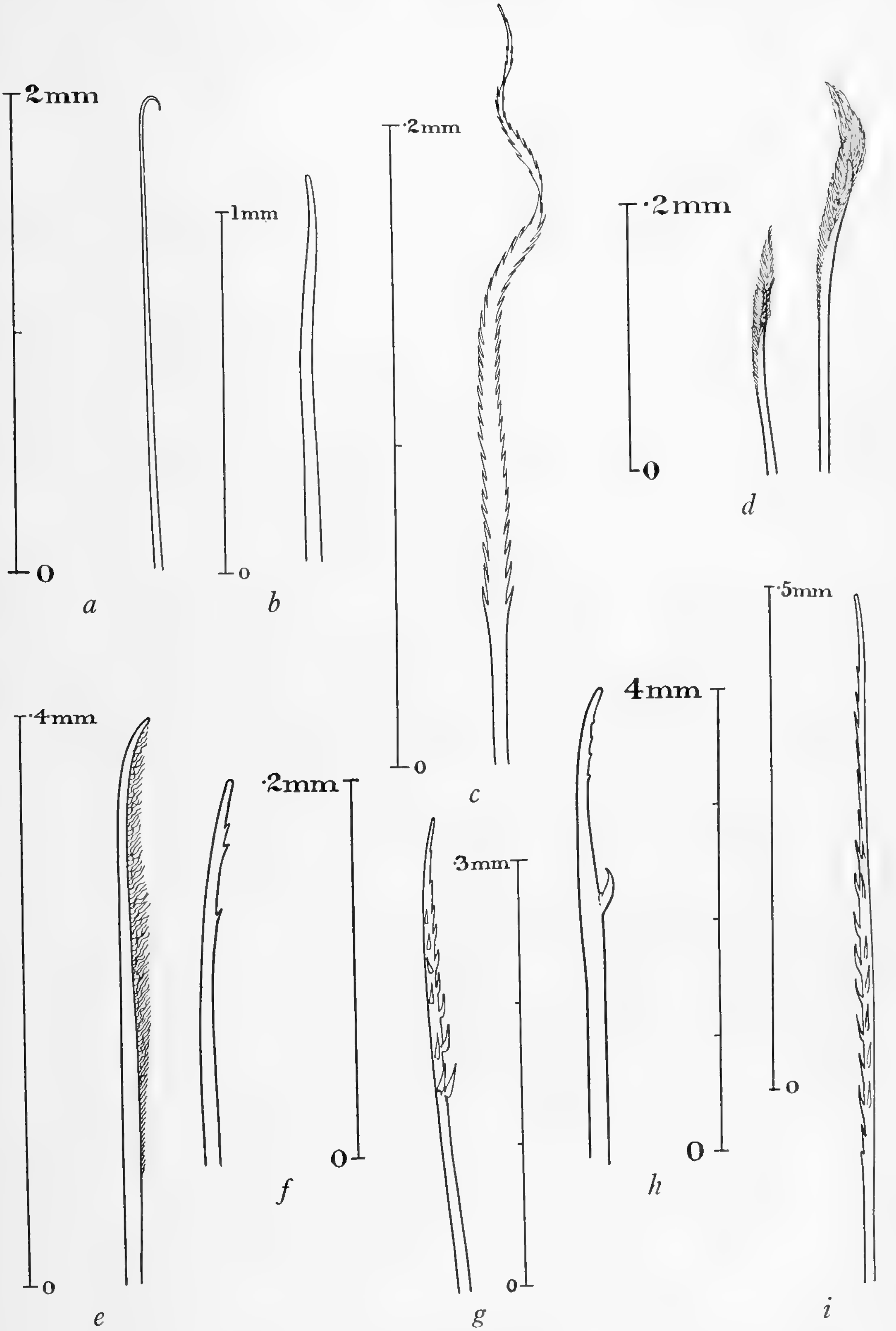


Fig. 5. *Aphrodite alta.*

a. Stout dorsal bristle. *b.* Upper bristle of second foot. *c.* Lower bristle of second foot. *d.* Ventral bristles of middle foot. *e.* Upper bristle of posterior foot. *f–i.* Posterior ventral bristles.

Description. Body oval, with flat papillated sole. The measurements are 25 mm. by 12 mm. including the feet. There are about 35 chaetigers. The back is a plaster of fine mud entangled with the felting, which is not penetrated by the dorsal bristles. On probing the felting these are seen as an occasional gleam of chestnut brown.

The prostomium is globular with a very short stout median tentacle, on either side of which is an ocular prominence without a trace of eyes. Below the tentacle there is a laterally compressed facial tubercle. The palps are stout, tapering and rather short, reaching to the 6th chaetiger (5th foot) when laid along the venter. The tentacular cirri are lost.

The dorsal bristles corresponding to the large bronzed bristles of the majority of species are very long, of a chestnut brown and end in a hook. They are nearly all broken off and lie loose, entangled in the felting. This may account for the fact that they do not project through the felting.

The ventral bristles of the first two chaetigers are of three types: (1) the upper are stout bronze-coloured bristles with slightly curved ends (Fig. 5, *b*); (2) a few middle bipinnate bristles; (3) the lower are similar to the middle bristles but more slender and spirally twisted (Fig. 5, *c*).

The ventral bristles of the middle feet of the body are of the usual three sizes, and all have slightly curved, heavily bearded ends (Fig. 5, *d*). The ventral bristles of the posterior feet change in the usual manner for the genus. The last half-dozen feet are so crowded together that I cannot count with certainty, but at about the 6th from the end the upper bristles (Fig. 5, *e*) are bearded much further down the shaft than in the middle body, and the middle and lower bristles are strongly denticulated. Further back there are a number of long, fine bristles with alternating teeth. In the last three or four feet of the body the ventral bristles are broken off. I have figured several types of posterior ventral bristle (Fig. 5, *f–i*).

In the middle feet the ventral cirri reach to the end of the foot, in the posterior feet they are longer.

Remarks. I have doubtfully assigned this example to Kinberg's species from off Rio Janeiro, on the ground that the dorsal felting conceals the dorsal bristles. The specimen is an *Aphroditella* or young *Aphrodite* and it is indistinguishable, as far as Horst's brief description goes (Horst, 1917, p. 49), from his *Aphroditella limosa* from a depth of 835 m. off the Malay Archipelago, except in the shape of the median tentacle. It is also very similar to *Aphrodite obtecta*, Ehlers from the coast of Florida and to the *A. talpa*, Quatrefages of Fauvel (Fauvel, 1925, pp. 140–144). It is distinguished from the *A. echidna*, Quatrefages of McIntosh from the Magellan region by the fact that in *A. echidna* the dorsal bristles project through the felting.

This is the first record of an *Aphrodite* from Antarctic waters.

Genus Laetmonice, Kinberg

Laetmonice producta, Grube.

Grube, 1877, p. 512.
Gravier, 1911, p. 80.

St. 42. 1. iv. 26. Off mouth of Cumberland Bay, South Georgia. From 6·3 miles N 89° E of Jason Light to 4 miles N 39° E of Jason Light. 120–204 m. Gear **OTL**. Bottom: mud. Five specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Eight specimens.

St. 123. 15. xii. 26. Off mouth of Cumberland Bay, South Georgia. From 4·1 miles N 54° E of Larsen Point to 1·2 miles S 62° W of Merton Rock. 230–250 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **N 4–T**. Bottom: green mud and sand. Two specimens.

St. 148. 9. i. 27. Off Cape Saunders, South Georgia. From 54° 03′ S, 36° 39′ W to 54° 05′ S, 36° 36′ 30″ W. 132–148 m. Gear **OTL**. Bottom: grey mud and stones. Four specimens.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N 76½° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. Six specimens.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH**. Bottom: rock. One specimen.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stones and rock. Two specimens.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH**. Bottom: rock. Twenty-five specimens.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. Twenty specimens.

St. 180. 11. iii. 27. 1·7 miles W of N point of Gand Island, Schollaert Channel, Palmer Archipelago. 160 m. Gear **DLH**. Bottom: mud and stones. Two young specimens.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. Thirty-two specimens.

St. 182. 14. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 21′ 00″ S, 62° 58′ 00″ W. 278–500 m. Gear **N 7–T**. Bottom: mud. Ten specimens.

St. 186. 16. iii. 27. Fournier Bay, Anvers Island, Palmer Archipelago. 64° 25′ 30″ S, 63° 02′ 00″ W. 295 m. Gear **DLH**. Bottom: mud. Two specimens.

St. 187. 18. iii. 27. Neumayr Channel, Palmer Archipelago. 64° 48′ 30″ S, 63° 31′ 30″ W. 259 m. Gear **DLH**. Bottom: mud. Five specimens.

St. WS 33. 21. xii. 26. 54° 59′ 00″ S, 35° 24′ 00″ W. 130 m. Gear **N 100–H**. Bottom: grey mud and stones. One specimen.

REMARKS. The variation in size ranges from young specimens with 30 chaetigers measuring about 10 mm. by 4 mm. excluding the feet, to huge forms with about 50 chaetigers and measuring 18 cm. by 3½ cm. Gravier records five specimens from King George Island, South Shetlands, and Ehlers an example from Kaiser William II Land.

In addition to a number of small organisms entangled with the bristles, as described by McIntosh (1885, p. 43) for his Kerguelen specimens, a sponge *Homaxinella supratumescens*, Topsent (I am indebted to my colleague, Mr M. Burton, for the name) is attached to the back of a specimen from St. 45. It is fixed to two adjacent notopodia and to the external edge of an elytron.

Family POLYNOIDAE

Genus **Hermadion**, Kinberg

Hermadion ferox, Baird.

Baird, 1865, p. 197.
Hermadion rouchi, Gravier, 1911, pp. 82–86, pl. iii, figs. 33–34; pl. iv, figs. 45–51; pl. vii, fig. 74.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear OTL. Bottom: grey mud. One specimen.

St. 42. 1. iv. 26. Off mouth of Cumberland Bay, South Georgia. From 6·3 miles N 89° E of Jason Light to 4 miles N 39° E of Jason Light. 120–204 m. Gear OTL. Bottom: mud. Two specimens.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N $76\frac{1}{2}$° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear OTL. Bottom: mud. Two specimens.

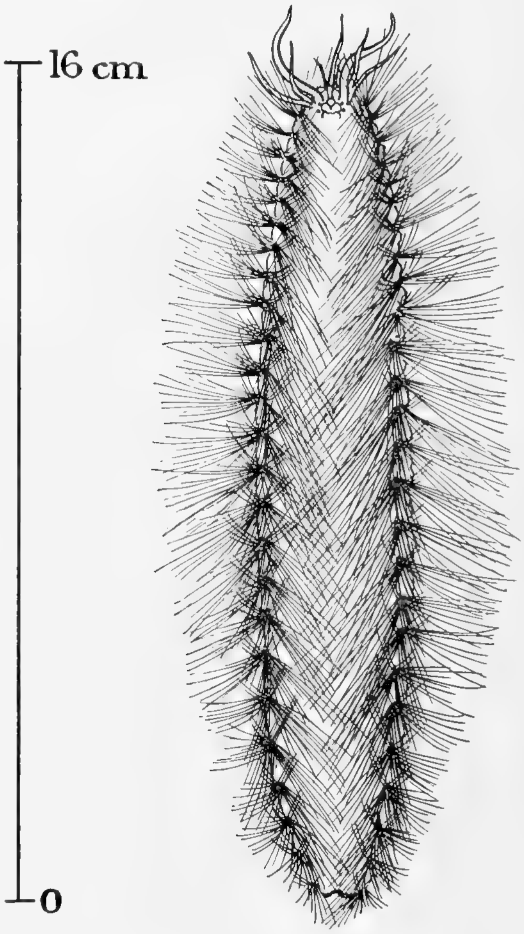


Fig. 6. *Hermadion ferox*. Dorsal view of entire specimen.

REMARKS. I have examined Baird's type specimen and it agrees exactly with Gravier's admirable description and figures of *Hermadion rouchi*.

From St. 42 there is a gigantic example (Fig. 6) with 60 chaetigers which measures 16 cm. by 6 cm. including the bristles.

Benham (1921, pp. 46–50) makes a lengthy comparative study of this species and is at pains to show that it is distinct from *Lagisca crosetensis*. I have examined McIntosh's type and I endorse Benham's conclusions. There is a tendency for *H. ferox* to grade into *H. magalhaensi*. The chief differences between the two are the presence in *H. ferox* of the palisade of long dorsal bristles and of giant spines on the elytra. There is a considerable variation in the extent to which the dorsal bristles arch over the back, and in the smaller specimen from St. 42 the giant spines are confined to the posterior border of the elytra, and in the hinder segments are absent altogether. It is not impossible that *H. ferox* be the sexual stage of *H. magalhaensi*.

Hermadion magalhaensi, Kinberg.

Kinberg, 1857, p. 22, pl. vi, fig. 22.
Fauvel, 1916, pp. 423–426, pl. viii, figs. 10–11. With synonymy.
Harmothoë magalhaensi, Bergström, 1916, p. 276.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. One specimen.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. Ten specimens.

St. 52. 5. v. 26. Port William, East Falkland Island. 7·4 cables N 17° E of Navy Point. 17 m. Gear **LH**. Three specimens.

St. 53. 12. v. 26. Port Stanley, East Falkland Island. Hulk of "Great Britain." 0–2 m. Gear **RM**. Sixty-three specimens.

St. 57. 16. v. 26. Port William, East Falkland Island. $5\frac{1}{2}$ cables S 20° W of Sparrow Point. 15 m. Gear **BTS**. Two specimens.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. Two specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. One specimen.

St. WS 73. 6. iii. 27. 51° 01′ 00″ S, 58° 54′ 00″ W. From 51° 02′ 00″ S, 58° 55′ 00″ W to 51° 00′ 00″ S, 58° 53′ 00″ W. 121–130 m. Gear **OTC**. Bottom: fine dark sand. Four specimens; one specimen from a Tubularian colony.

St. WS 80. 14. iii. 27. 50° 57′ 00″ S, 63° 37′ 30″ W. From 50° 58′ 00″ S, 63° 39′ 00″ W to 50° 55′ 30″ S, 63° 36′ 00″ W. 152–156 m. Gear **OTC**. Bottom: fine dark sand. Nine specimens.

St. WS 81. 19. iii. 27. 8 miles N 11° W of North Island, West Falkland Island. From 51° 30′ 00″ S, 61° 15′ 00″ W to 51° 30′ 30″ S, 61° 10′ 00″ W. 81–82 m. Gear **OTC**. Bottom: sand. One specimen taken from a *Chaetopterus* tube.

St. WS 84. 24. iii. 27. $7\frac{1}{2}$ miles S 9° W of Sea Lion Island, East Falkland Island. From 52° 33′ 00″ S, 59° 08′ 00″ W to 52° 34′ 30″ S, 59° 11′ 00″ W. 75–74 m. Gear **OTC**. Bottom: coarse sand, shell and stones. Thirty-eight specimens.

St. WS 85. 25. iii. 27. 8 miles S 66° E of Lively Island, East Falkland Island. From 52° 09′ 00″ S, 58° 14′ 00″ W to 52° 08′ 00″ S, 58° 09′ 00″ W. 79 m. Gear **OTC**. Bottom: sand and shell. Nine specimens.

St. WS 93. 9. iv. 27. 7 miles S 80° W of Beaver Island, West Falkland Island. From 51° 51′ 00″ S, 61° 30′ 00″ W to 51° 54′ 00″ S, 61° 30′ 00″ W. 133–130 m. Gear **OTC**. Bottom: grey sand. One specimen.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. $9\frac{1}{4}$ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **BTS**. One specimen.

Remarks. The brown colour markings on the elytra vary greatly in intensity and are sometimes absent. The elytra are thickly covered with small tubercles. The dorsal chaetae are dark brown, stout, upturned and lightly pectinated: the ventral are unidentate and with well-developed scales. The last 12 to 14 chaetigers are left uncovered by the elytra.

From St. 140 is one specimen in which the dorsal bristles are to some extent arched over the back, as in *H. ferox*, Baird (*H. rouchi*, Gravier). This may be a sexual condition.

Genus **Podarmus**, Chamberlin

Podarmus atlanticus, n.sp.

St. 282. 12. viii. 27. 1° 11′ 00″ S, 5° 38′ 00″ E. 300 (–0) m. Gear **TYF**. One specimen.

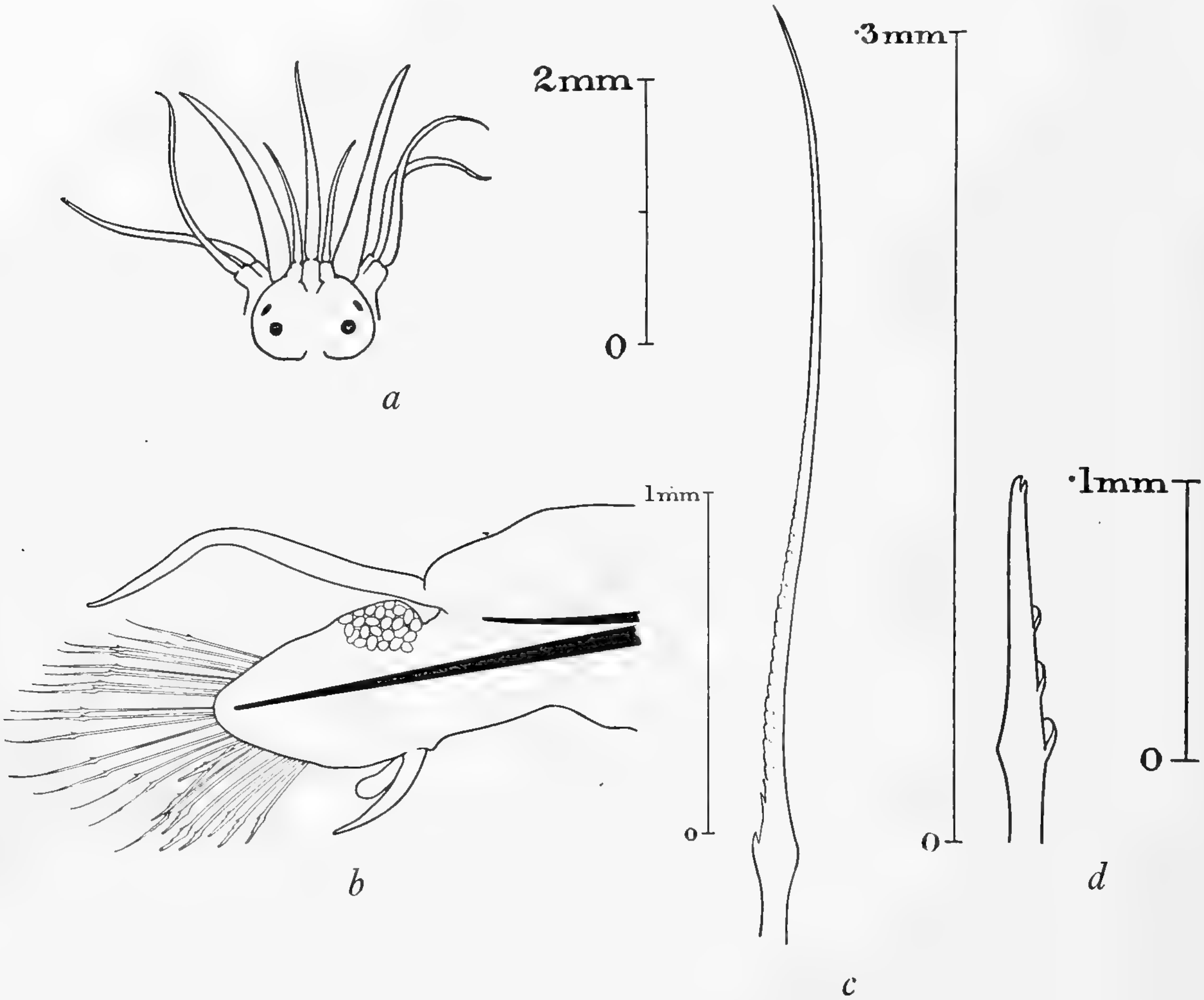


Fig. 7. *Podarmus atlanticus*.

a. Head. *b*. Middle foot. *c*. Upper and middle bristle. *d*. Lower bristle.

DESCRIPTION. The specimen measures 13 mm. by 2 mm. without the feet, and has about 45 chaetigers and 18 pairs of elytrophores. There is no colour.

The head (Fig. 7, *a*) is broader than long, somewhat rounded in shape, and with two pairs of small eyes set rather far back and to the side. The insertion of the lateral tentacles appears to be subterminal as in *Halosydna*, but of this I am not sure. The median tentacle is about of the same length as the long and rather slender palps, and it is longer than the lateral tentacles. The tentacular cirri are rather longer than the tentacles and there is a long ventral cirrus on the first foot. The elytrophore of the first foot is a cylindrical structure about half the length of the foot; the remaining elytrophores are conspicuous but not unusually prominent.

The dorsal cirri reach to the tips of the bristles and the ventral are shorter than the feet. The parapodia (Fig. 7, *b*) are biramous, the dorsal branch consisting of a small lobe containing a sheathed aciculum[1], but no bristles. The neuropodium has two rather prominent, bluntly conical lips of about the same length, between which the bristles are arranged in a vertical series.

The upper and middle bristles (Fig. 7, *c*) are long, fine-scaled capillaries ending in a delicate, whip-like tip. Below these are about a dozen much shorter bristles (Fig. 7, *d*), expanded towards the apex, toothed above the expansion and ending in a bidentate tip. The cylindrical clavate process, which adjoins the ventral cirrus, appears to be absent from the first four or five feet. It is an enlarged genito-nephridial papilla.

REMARKS. This pelagic species is close to the *Podarmus ploa* of Chamberlin from Easter Island, but is distinguished by the bidentate character of its lower ventral bristles.

Genus **Sheila**, gen. nov.

DIAGNOSIS. The lateral tentacles are inserted terminally as in *Lepidonotus*. There are 13 pairs of elytra inserted on segments 2, 4, 5, 7, 9, etc. The feet are biramous, but the dorsal ramus is reduced. The notopodial chaetae are delicate toothed capillaries, slightly finer than the neuropodials. These consist of long toothed capillaries, a few shorter and stouter toothed bristles ending in a blunt hook, and in the middle of the neuropodium a single giant bidentate hook. The genotype is bathypelagic.

Sheila bathypelagica, n.sp.

St. 256. 23. vi. 27. 35° 14′ 00″ S, 6° 49′ 00″ E. 850–1100 m. Gear **TYF**. One specimen.

DESCRIPTION. The specimen measures 9 mm. by 2 mm. without the feet: there are about 29 chaetigers and 13 pairs of elytrophores. In spirit the back is pale grey with rather faint transverse segmental bands of a darker colour interrupted in the middle line. The undersurface and the feet are a deep black; the tentacles and cirri are also black except at their tips, but the palps are a pale grey.

The head (Fig. 8, *a*) is longer than broad and bulged at the sides. The whole of the lateral surfaces are occupied by two pairs of large contiguous eyes with white centres and dark brown edges. The three tentacles leave the head at the same level, are all of the same length, about two-thirds that of the prostomium, and end in a flagelliform tip. Below the lateral tentacles is a pair of palps, each ending in a small mamilla; they are of about the same length as the tentacles but twice as thick. Set close to the side of the palps is a pair of tentacular cirri about twice the length of the other appendages. Palps, tentacles and cirri are smooth. All the elytra are lost.

The dorsal cirri are long, reaching almost to the tips of the bristles, and the ventral cirri are very short.

[1] There is no etymological warrant for the form *aciculum* with plural in *a*: the Latin *acicula* is a feminine noun with plural in *ae*. The incorrect variant is, however, so firmly established as part of the English terminology of the Polychaeta that I prefer to retain it.

The feet (Fig. 8, *b*) are biramous, but the dorsal branch is reduced. On the top of the foot a sheathed aciculum makes a small projection, and with it is a bundle of about a dozen long, fine, toothed, capillary bristles.

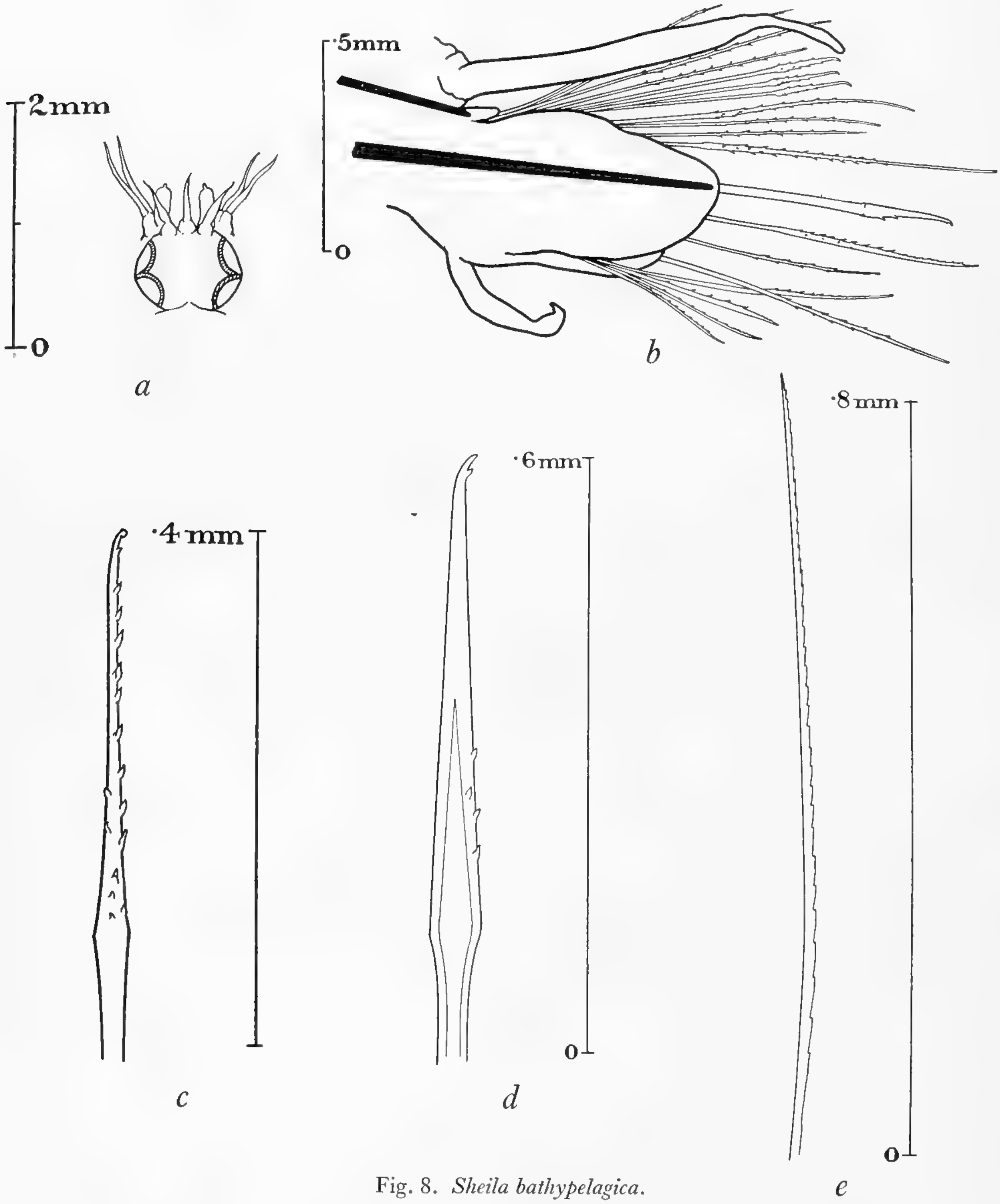


Fig. 8. *Sheila bathypelagica*.
a. Head. *b*. Foot. *c*. Short neuropodial bristle. *d*. Giant bristle. *e*. Ventral capillary bristle.

The ventral branch consists of two large bluntly conical lips from between which the bristles come out. The uppermost ventral bristles are similar to the dorsal but rather stouter; a little lower there are three or four much stouter and shorter toothed bristles,

(Fig. 8, *c*) ending in a sort of blunt hook; below these again and in the centre of the foot is a single, gigantic, toothed, bidentate hook (Fig. 8, *d*). The lower ventral (Fig. 8, *e*) bristles are toothed capillaries similar to the upper, and there is a tendency for these to be stouter the nearer they are to the central giant hook. All the capillary chaetae are glassy and transparent, but the giant hook is bright yellow.

The pygidium is slightly damaged, so I cannot tell whether there were any styles or appendages.

REMARKS. I found myself unable to include this specimen within any known genus. Of the known pelagic genera, *Frenna*, *Quetieria*, *Drieschia*, *Plotolepis* and *Podarmus* are all without dorsal bristles; *Harmopsides* has a subtentacular cirrus and no notopodial chaetae, and many other distinctive characters; *Nectochaeta* has a different shaped head, feet and bristles, and *Macellicephala* has no lateral tentacles. The present specimen is probably the young pelagic stage of another species.

Genus **Lagisca**, Malmgren

Lagisca hubrechti (McIntosh).

Fauvel, 1923, p. 78, fig. 29 *a–k*.

St. 100. 3–4. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. 2500–2000 m. Gear **TYF**. One specimen.

St. 169. 22. ii. 27. 60° 48′ 50″ S, 51° 00′ 20″ W. 1000–1100 m. Gear **TYF**. One specimen.

St. 267. 23. vii. 27. 24° 31′ 00″ S, 12° 15′ 30″ E. 450–550 (–0) m. Gear **TYF**. One specimen.

REMARKS. The three examples of this bathypelagic species correspond in detail to Fauvel's description. It is characterised by the transparent dorsal bristles, the long unidentate ventral bristles with their rows of scales and the large caudal appendage. It is remarkable to find it as far south as off the South Shetlands.

Genus **Malmgrenia**, McIntosh

? **Malmgrenia micropoides**, Augener.

Augener, 1918, pp. 146–148, pl. ii, fig. 21; pl. iii, fig. 43, text-fig. 8.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. One specimen.

REMARKS. This example is a macerated fragment without head or elytra. The feet and bristles seem to correspond to Augener's description and figures. The dorsal ramus is set far back, so that the tips of the bristles barely reach to the end of the ventral chaeta sac. Both rami are more or less pointed, and the lip of the ventral ramus is produced into a cirriform process (Fig. 9, *a*).

The dorsal bristles (Fig. 9, *b*) are less numerous and very much finer than the ventral. They resemble Augener's figure.

The ventral bristles (Fig. 9, *c*) are relatively broader than those figured by Augener, and the gap between the two terminal teeth less wide. Moreover, the uppermost ventral bristles are unidentate and the rest bidentate, a condition apparently exactly the reverse of that described by Augener, who records that the lowest ventral bristles sometimes lacked the second tooth.

It is not possible to attribute this fragment to a species with any certainty.

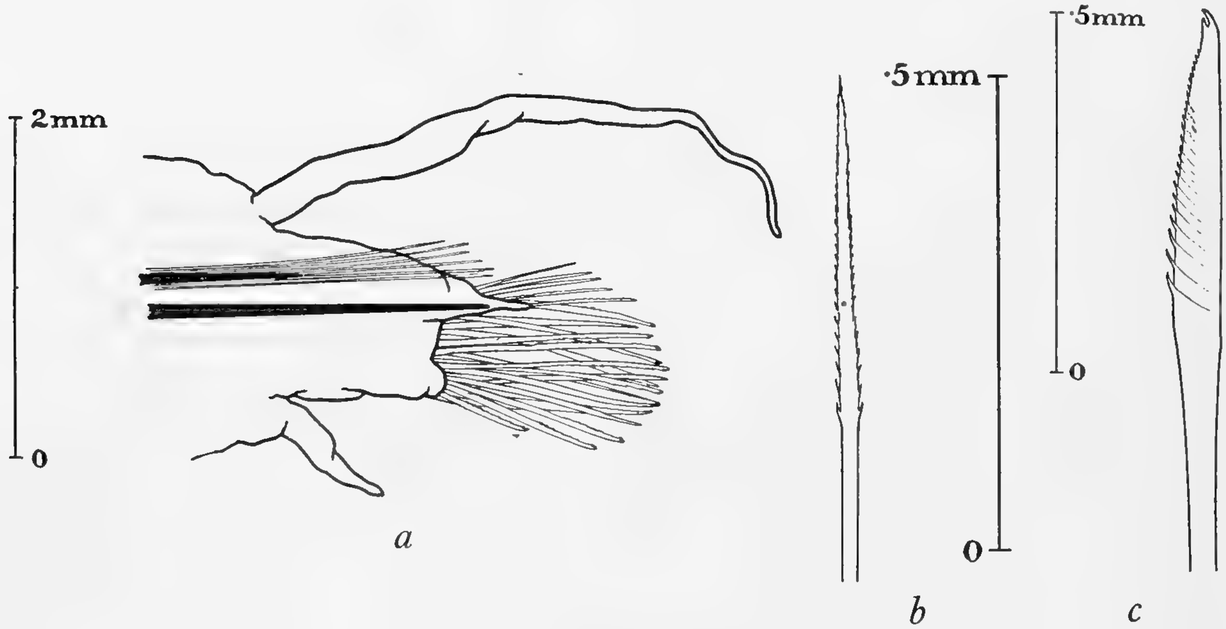


Fig. 9. ? *Malmgrenia micropoides*.
a. Foot. *b*. Dorsal bristle. *c*. Ventral bristle.

Genus **Nectochaeta**, Marenzeller

Nectochaeta caroli, Fauvel.

Fauvel, 1916, p. 39, pl. i, figs. 24–27; pl. ii, figs. 16–18; and 1923, p. 91, fig. 35 *a–f*.

St. 273. 31. vii. 27. 9° 38′ 00″ S, 12° 42′ 30″ E. 200–230 (–0) m. Gear **TYF**. Three specimens.
St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. 110 (–0) m. Gear **N 100 B**. Twenty-nine specimens.

Remarks. These specimens correspond so closely to Fauvel's description that there is very little I can add. The larger specimens have about 40 chaetigers and 16 pairs of elytrophores: they measure about 37 mm. by 2 mm. without the feet and 6 mm. including the feet. All the elytra are lost. In most of the specimens the huge cirrophores are larger anteriorly than behind. Up to about the 16th chaetiger they are longer than the feet; further back they are of about the same length. Up to the 11th to 13th feet the cirrophores are transparent; over the rest of the body they are filled with a pale brown, or grey, granular inclusion. On staining this shows itself to be glandular tissue with a granular secretion. The elytra are all lost. The notopodial aciculum is clearly visible in all the feet.

Genus **Macellicephala**, McIntosh

Macellicephala sp.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W. to 53° 58′ S, 36° 26′ W. 155–178 m. Gear NCS–T. Bottom: green mud and sand. One specimen.

DESCRIPTION. This much damaged specimen measures 21 mm. by 5 mm. without the feet. The back is irregularly splashed with purplish brown.

The prostomium is deeply incised in front but not so deeply as in *M. mirabilis*. There is no trace of eyes, and all the appendages are lost except a fairly short palp with an abrupt blunt end and a single tapering dorsal tentacular cirrus, as long as the prostomium is broad. The ventral cirrus of the first foot reaches to the end of the chaeta sac.

There are 17 feet and 9 pairs of elytrophores. The feet (Fig. 10, *a*) are biramous; the dorsal branch is reduced to a single long sheathed aciculum with, in the middle and posterior segments, one or two bristles lying in the tissue beside it. In a preparation of a posterior foot the end of one of these bristles projects clear of the tissue.

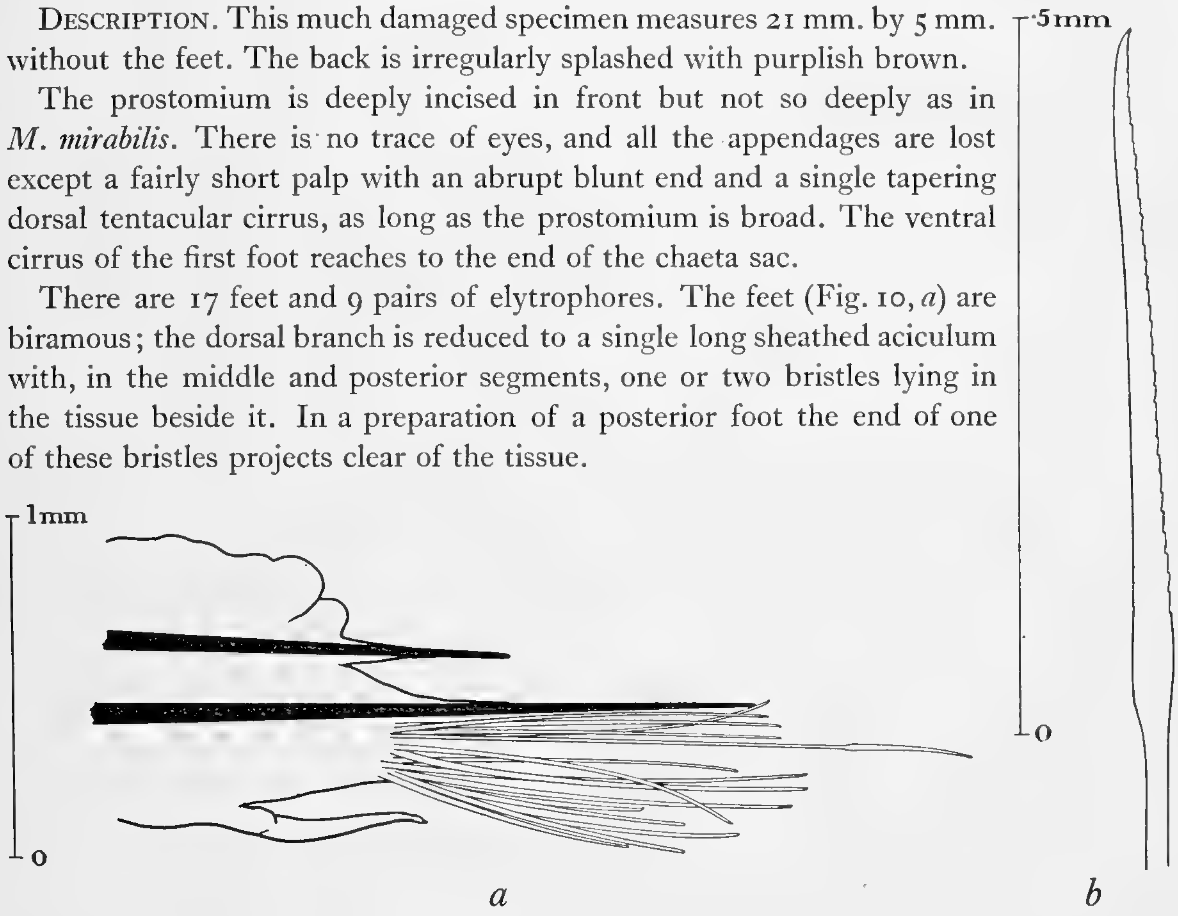


Fig. 10. *Macellicephala* sp.

a. Foot. *b*. Ventral bristle.

The ventral branch is slightly longer, shaped like a very narrow cone and ends in a long sheathed aciculum: it contains a bundle of transparent bristles (Fig. 10, *b*) lightly serrated on one side only. The ventral cirri are small, not reaching to the end of the foot.

REMARKS. *Macellicephala* is a pelagic genus. Unfortunately this example is so much damaged that its specific attribution is impracticable. It differs from *M. mirabilis*, McIntosh, from New Zealand, in the shape of the prostomium, and in the absence of eyes and of a dorsal bristle bundle. The shape of the feet is similar to that of Fauvel's *M. incerta* and *M. affinis*, but it differs from these in the character of its bristles.

Genus **Euphione**, McIntosh

Euphione elisabethae, McIntosh.

McIntosh, 1885, pp. 62–64, pl. ix, fig. 3; pl. xvii, fig. 7; pl. xviii, fig. 10; pl. viii A, figs. 3–6.

St. M. Cape Trawler. 9. vii. 27. 33° 42′ 00″ S, 17° 29′ 00″ E. 310–402 m. Gear **OTC**. Found on coral. Three specimens.

REMARKS. These examples measure about 40 mm. by 17 mm. In one of them the very large type of rotate tubercle on the elytra is absent.

Genus **Scalisetosus**, McIntosh

Scalisetosus pellucidus (Ehlers).

Fauvel, 1923, p. 74, fig. 27 *a–f*.
Scalisetosus communis, Ehlers, 1913, p. 447.

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa. Basin of H.M. Dockyard. 0–2 m. Gear **NH**. Two specimens.

St. MS 82. 6. ix. 26. Off Salamander Point, Saldanha Bay, South Africa. 7–14 m. Gear **BTS**. One specimen.

REMARKS. Three small specimens. Ehlers records the presence of this species at Simon's Town.

Genus **Lepidonotus**, Leach

Lepidonotus semitectus, Stimpson.

Ehlers, 1913, p. 447.

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa. Basin of H.M. Dockyard. 0–2 m. Gear **NH**. Five specimens.

REMARKS. All the specimens are small, measuring between 10 and 15 mm. in length. The first pair of scales and the anterior half of the second are much lighter in colour than the rest, which are either mottled with dark grey or, as in three of the examples, of a uniform deep orange colour.

The German South Polar Expedition collected specimens of this species at Simon's Town.

Genus **Eulagisca**, McIntosh

Eulagisca corrientis, McIntosh.

McIntosh, 1885, pp. 91–93, pl. xiii, fig. 4; pl. vii A, figs. 3, 4.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH**. Bottom: rock. One fragmentary specimen.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. Two fragmentary specimens.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH** and **NRL**. Bottom: stones, mud and rock. One complete specimen.

Description. The single complete example measures 60 mm. by 27 mm. including the feet. Body colour in spirit is a pale yellow and the back is strongly but irregularly splashed with purple: the tentacles and the tentacular and dorsal cirri are spotted with purple and there is a purple band round the top of the elytrophores and dorsal cirrophores.

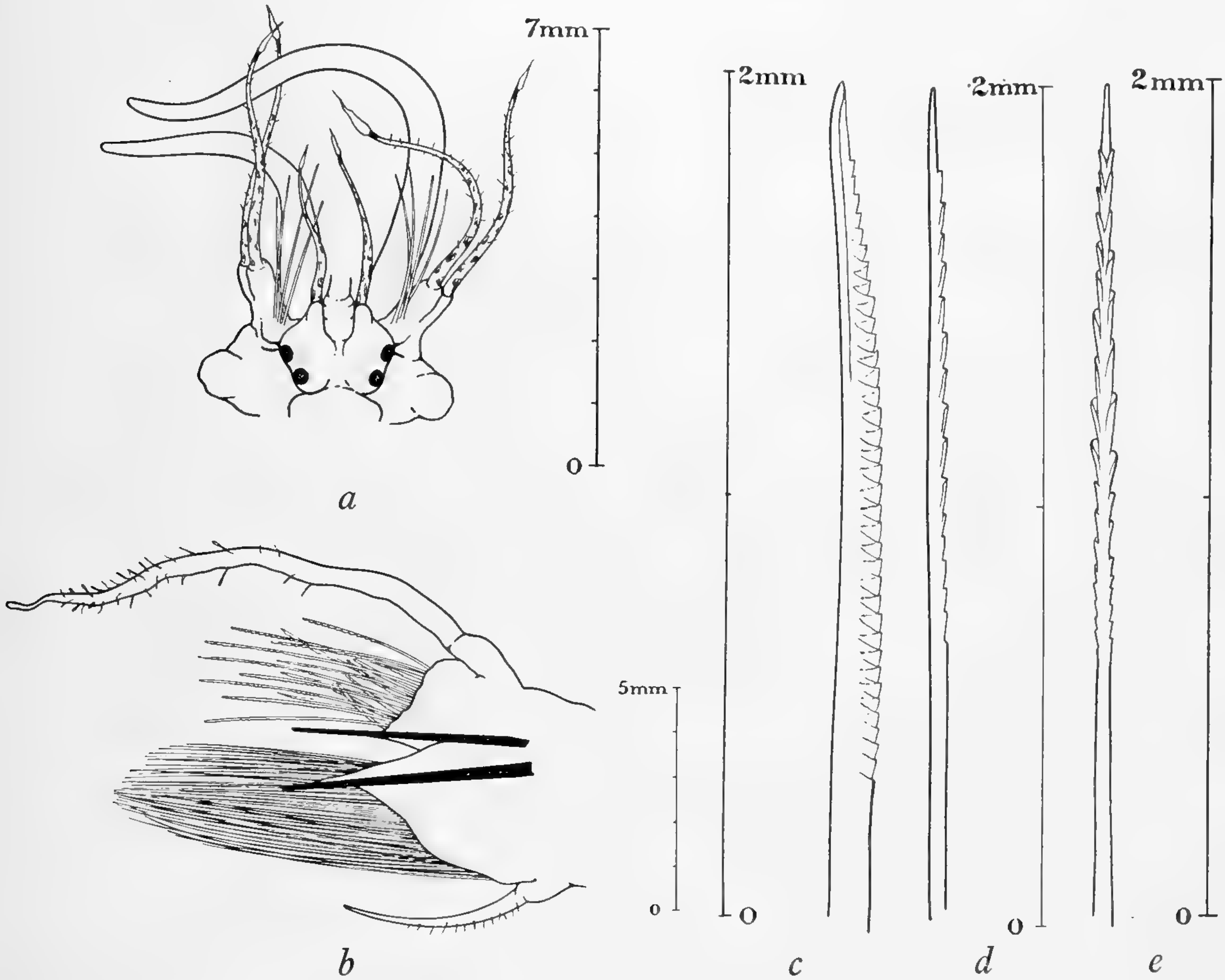


Fig. 11. *Eulagisca corrientis*.

a. Head. *b*. Foot. *c*. Dorsal bristle. *d*. Ventral bristle in profile. *e*. Ventral bristle.

The prostomium (Fig. 11, *a*) is subrectangular, and there are two pairs of large eyes both set rather far back and to the sides. The head is of the lepidonotid type and the lateral tentacles are terminally inserted. The medium tentacle is lost and the laterals are nearly twice as long as the prostomium. The palps are as long as the head and the first seven chaetigers, and the tentacular cirri are about two-thirds of their length.

All the appendages except the palps, which are thickly covered with small papillae, are very hirsute. Below the median tentaculophore is a small digitiform process (subtentacular cirrus), which is probably a facial tubercle. From just above the junction of the tentaculophores of the tentacular cirri on both sides is a bundle of about half a dozen stout bristles pointing directly forwards.

There are 15 pairs of prominent elytrophores and the elytra are all lost. The pseudo-elytrophores are scarcely less prominent than the elytrophores. The dorsal cirrophores are set low down on the foot and are very large structures with a prominent lateral bulge or expansion. The dorsal cirri are very long, the tips of the bristles only reaching to about half their length.

The feet (Fig. 11, *b*) are biramous and the bristles very numerous. Both dorsal and ventral lobes have long pointed prolongations containing the acicula. The dorsal aciculum reaches to about half the length of the dorsal bristles; the ventral is a little longer. The dorsal bristles (Fig. 11, *e*) are stouter than the ventral, strongly pectinate on one edge and smooth at their tips. The ventral (Fig. 11, *d* and *e*) are unidentate with well-developed rows of teeth. The ventral cirri are short, barely reaching to the end of the chaeta sac.

REMARKS. I have examined McIntosh's type specimens, and I believe the present Antarctic examples to be conspecific with them. McIntosh does not record the arrangement of the elytra; they occur on the following feet: 1, 3, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 25, 28, 31. This species is now known from the South Shetlands, from the vicinity of Kerguelen Island and from 600 fathoms off Buenos Ayres.

Genus **Eunoë**, Malmgren

Eunoë opalina, McIntosh.

McIntosh, 1885, pp. 71–72, pl. x, fig. 5; pl. xix, fig. 2; pl. viii A, figs. 9–11.

St. 187. 18. iii. 27. Neumayr Channel, Palmer Archipelago. 64° 48′ 30″ S, 63° 31′ 30″ W. 259 m. Gear **DLH**. Bottom: mud. One specimen.

DESCRIPTION. This example has 20 chaetigers followed by a regenerating hinder end of 12 chaetigers. The measurement is 24 mm. by 10 mm. including the feet, and the colour in spirit is a pale yellow.

McIntosh has a good figure of the head. The eyes are lateral and the two pairs are set close together. The front pair is about half-way up the prostomium and the hinder pair is a little more lateral than as shown in McIntosh's figure. The lateral tentaculophores are larger and more prominent than as drawn by McIntosh, and the lateral tentacles are slightly longer than the prostomium. The palps are long and tapering and the ventral cirrus of the first foot is prolonged into a sort of accessory tentacular cirrus. Nearly all the elytra are lost and the few that remain are damaged. They are thin semi-transparent structures

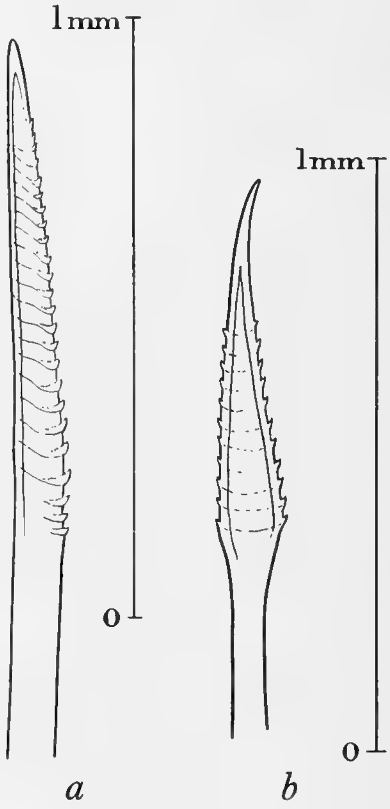


Fig. 12. *Eunoë opalina*.
a. Dorsal bristle. *b*. Ventral bristle.

of a milky colour, smooth except for a large patch of small tubercles near the scar of attachment. In a fragment of an anterior scale part of the edge had a few minute papillae projecting over it.

The feet are biramous and the dorsal cirri reach to the tips of the ventral bristles. The bristles are few in number: the dorsal (Fig. 12, *a*) are pointed and with smooth tips; the shaft is so lightly pectinated as to appear almost smooth. The ventral bristles (Fig. 12, *b*) are longer than the dorsal and almost of the same thickness. They are expanded towards the tip, which is smooth and slightly curved: the expanded part is traversed by very delicate pectinae which are often visible in profile on both sides of the blade, and not on one only as in McIntosh's figure (Pl. viii A, fig. 11). The ventral cirri reach about one-half the way down the ventral bristles.

REMARKS. I have examined McIntosh's type obtained at a depth of 245 fathoms in the Straits of Magellan, and I believe this Antarctic specimen to be conspecific with it.

Genus **Eucrantha**, Malmgren

Eucrantha mollis (McIntosh).

Eupolynoë mollis, McIntosh, 1879, p. 259, pl. xv, figs. 5–9.
Eucrantha mollis, Bergström, 1916, p. 294.

St. 159. 21. i. 27. 53° 52′ 30″ S, 36° 08′ 00″ W. 160 m. Gear **DLH**. Bottom: rock. One specimen.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH**. Bottom: rock. Two specimens.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. Four specimens.

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. From 49° 00′ 00″ S, 62° 00′ 00″ W to 49° 01′ 00″ S, 61° 56′ 00″ W. 146–145 m. Gear **OTC**. Bottom: sand, gravel, stones. One specimen.

REMARKS. Both McIntosh and Bergström give good accounts of this species, which is easily distinguishable by the long slender upper and lower ventral bristles with their minutely bifid tips. Bergström's figure (Text-fig. 2, *setae furcatae* Typus F) of the upper ventral bristles is a little misleading, because the rows of scales are not continued to the apex, and the curve is more pronounced than that of any I have seen either in these specimens or in McIntosh's type.

Genus **Polyeunoa**, McIntosh

Polyeunoa laevis, McIntosh.

McIntosh, 1885, pl. xii, fig. 2; pl. xx, fig. 8; pl. vii A, figs. 12–13.
Enipo rhombigera, Ehlers, 1908, pp. 47–49, pl. iv, figs. 1–12.
Polyeunoa laevis, Bergström, 1916, pp. 288–291, pl. iii, fig. 7.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **OTL**. Bottom: grey mud. Twelve specimens.

St. 42. 1. iv. 26. Off mouth of Cumberland Bay, South Georgia. From 6·3 miles N 89° E of Jason Light to 4 miles N 39° E of Jason Light. 120–204 m. Gear **OTL**. Bottom: mud. One specimen.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. Thirty-one specimens.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **N** 4–T. Bottom: green mud and sand. One specimen.

St. 148. 9. i. 27. Off Cape Saunders, South Georgia. From 54° 03′ S, 36° 39′ W to 54° 05′ S, 36° 36′ 30″ W. 132–148 m. Gear **OTL**. Bottom: grey mud and stones. One specimen.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N 76½° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. One specimen.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH**. Bottom: rock. One specimen.

St. 159. 21. i. 27. 53° 52′ 30″ S, 36° 08′ 00″ W. 160 m. Gear **DLH**. Bottom: rock. One specimen.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stones, rock. Eleven specimens.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH**. Bottom: rock. Two specimens.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. One specimen.

St. 182. 14. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 21′ 00″ S, 62° 58′ 00″ W. 278–500 m. Gear **OTL**. Bottom: mud. Eleven specimens. (Collector's note: "One specimen with deep metallic blue colouring and one banded with brown. Both living along stems of large yellow Alcyonarians.")

St. 187. 18. iii. 27. Neumayr Channel, Palmer Archipelago. 64° 48′ 30″ S, 63° 31′ 30″ W. 259 m. Gear **DLH**. Bottom: mud. Five specimens.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 126–315 m. Gear **NRL** and **DLH**. Bottom: mud, stones and rock. Seven specimens.

St. WS 81. 19. iii. 27. 8 miles N 11° W of North Island, West Falkland Island. From 51° 30′ 00″ S, 61° 15′ 00″ W to 51° 30′ 30″ S, 61° 10′ 00″ W. 81–82 m. Gear **OTC**. Bottom: sand. One specimen.

St. WS 82. 21. iii. 27. 54° 06′ 00″ S, 57° 46′ W. From 54° 05′ 00″ S, 57° 45′ 00″ W to 54° 07′ 00″ S, 57° 47′ 30″ W. 140–144 m. Gear **OTC**. Fourteen specimens.

St. WS 83. 24. iii. 27. 14 miles S 64° W of George Island, East Falkland Island. From 52° 28′ 00″ S, 60° 06′ 00″ W to 52° 30′ 00″ S, 60° 09′ 30″ W. 137–129 m. Gear **OTC**. Bottom: fine green sand and shell. Twenty-seven specimens.

St. WS 85. 25. iii. 27. 8 miles S 66° E of Lively Island, East Falkland Island. From 52° 09′ 00″ S, 58° 14′ 00″ W to 52° 08′ 00″ S, 58° 09′ 00″ W. 79 m. Gear **OTC**. Bottom: sand and shell. Two specimens.

St. WS 86. 3. iv. 27. 53° 53′ 30″ S, 60° 34′ 30″ W. From 53° 53′ 00″ S, 60° 37′ 00″ W to 53° 54′ 00″ S, 60° 32′ 00″ W. 151–147 m. Gear **OTC**. Bottom: sand, shell and stones. Five specimens.

St. WS 91. 8. iv. 27. 52° 53′ 45″ S, 64° 37′ 30″ W. From 52° 54′ 30″ S, 64° 39′ 00″ W to 52° 53′ 00″ S, 64° 36′ 00″ W. 191–205 m. Gear **OTC**. Bottom: fine dark sand and shell. One specimen.

St. WS 93. 9. iv. 27. 7 miles S 80° W of Beaver Island, West Falkland Island. From 51° 51′ 00″ S, 61° 30′ 00″ W to 51° 54′ 00″ S, 61° 30′ 00″ W. 133–130 m. Gear **OTC**. Bottom: grey sand. Twenty-three specimens.

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. From 49° 00′ 00″ S, 62° 00′ 00″ W to 49° 01′ 00″ S, 61° 56′ 00″ W. 146–145 m. Gear **OTC**. Bottom: sand, gravel and stones. Five specimens, associated with an Alcyonarian.

REMARKS. There is much variation in the arrangement of the pigment. The longitudinal dorsal stripe and the transverse markings may be both present or both absent, or one may be present and the other absent. In some specimens there is a series of dark brown markings on the ventral surface just below the neuropods. In a few examples the ventral surface is a deep purple.

The elytra are smooth except for a small patch of minute tubercles: the dorsal bristles are smooth or very lightly striated: the ventral bristles are unidentate and expanded towards the tip. Bergström has made a careful study of the variation in the arrangement of the elytra in this species.

Genus **Polynoë**, Oersted, sensu stricto

Polynoë antarctica, Kinberg.

Kinberg, 1857, p. 23, pl. x, fig. 58.
Fauvel, 1916, p. 426.
Harmothoë antarctica, Bergström, 1916, p. 279.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. Two specimens.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. One specimen.

St. WS 73. 6. iii. 27. 51° 01′ 00″ S, 58° 54′ 00″ W. From 51° 02′ 00″ S, 58° 55′ 00″ W to 51° 00′ 00″ S, 58° 53′ 00″ W. 121–130 m. Gear **OTC**. Bottom: fine dark sand. Three specimens.

St. WS 79. 13. iii. 27. 51° 01′ 30″ S, 64° 59′ 30″ W. From 51° 00′ 00″ S, 65° 00′ 00″ W to 51° 03′ 00″ S, 64° 59′ 00″ W. 132–131 m. Gear **OTC**. Bottom: fine dark sand. One specimen.

St. WS 80. 14. iii. 27. 50° 57′ 00″ S, 63° 37′ 30″ W. From 50° 58′ 00″ S, 63° 39′ 00″ W to 50° 55′ 30″ S, 63° 36′ 00″ W. 152–156 m. Gear **OTC**. Bottom: fine dark sand. One specimen.

St. WS 81. 19. iii. 27. 8 miles N 11° W of North Island, West Falkland Island. From 51° 30′ 00″ S, 61° 15′ 00″ W to 51° 30′ 30″ S, 61° 10′ 00″ W. 81–82 m. Gear **OTC**. Bottom: sand. One specimen.

REMARKS. All the specimens occur north of 52°, except the example from the Palmer Archipelago, which is doubtfully attributable to this species. This specimen has the scales and body coloured chestnut brown. The structure of the foot is typical, except that there is a large bundle of abundant dorsal bristles instead of the usual few. The dorsal cirri are very long, the tips of the ventral chaetae reaching only to about half their length. There are only about 12 chaetigers behind the last pair of elytrophores. The bristles are typical.

Genus **Harmothoë**, Kinberg

Harmothoë magellanica (McIntosh).

Lagisca magellanica, McIntosh, 1885, p. 82, pl. xiii, fig. 5; pl. xviii, figs. 3–4; pl. vii A, figs. 1–2.
Harmothoë magellanica, Bergström, 1916, pp. 280–282, pl. iv, figs. 1–3.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Twelve specimens.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **OTL**. Bottom: grey mud. Five specimens.

St. 42. 1. iv. 26. Off mouth of Cumberland Bay, South Georgia. From 6·3 miles N 89° E of Jason Light to 4 miles N 39° E of Jason Light. 120–204 m. Gear **OTL**. Bottom: mud. Ten specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Twenty-one specimens.

St. 123. 15. xii. 26. Off mouth of Cumberland Bay, South Georgia. From 4·1 miles N 54° E of Larsen Point to 1·2 miles S 62° W of Merton Rock. 230–250 m. Gear **OTL**. Bottom: grey mud. Twenty-five specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. Seven specimens.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **N 4–T**. Bottom: green mud and sand. Five specimens.

St. 146. 8. i. 27. 53° 48′ 00″ S, 35° 37′ 30″ W. 728 m. Gear **DLH**. Bottom: rock. Five specimens.

St. 148. 9. i. 27. Off Cape Saunders, South Georgia. From 54° 03′ S, 36° 39′ W to 54° 05′ S, 36° 36′ 30″ W. 132–148 m. Gear **OTL**. Bottom: grey mud and stones. Twelve specimens.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N 76½° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. Twenty-three specimens.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH**. Bottom: rock. Two specimens.

St. 156. 20. i. 27. 53° 51′ 00″ S, 36° 21′ 30″ W. 200–236 m. Gear **DLH**. Bottom: rock. Three specimens.

St. 159. 21. i. 27. 53° 52′ 30″ S, 36° 08′ 00″ W. 160 m. Gear **DLH**. Bottom: rock. Twelve specimens.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stones, rock. Eight specimens.

St. 187. 18. iii. 27. Neumayr Channel, Palmer Archipelago. 64° 48′ 30″ S, 63° 31′ 30″ W. 259 m. Gear **DLH**. Bottom: mud. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 126–315 m. Gear **DLH** and **NRL**. Bottom: mud, stones and rock. Four specimens.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear **OTM**. Bottom: mud and stones. One specimen.

St. WS 27. 19. xii. 26. 53° 55′ 00″ S, 38° 01′ 00″ W. 107 m. Gear **N 100 H**. Bottom: gravel. Six specimens.

St. WS 73. 6. iii. 27. 51° 01′ 00″ S, 58° 54′ 00″ W. From 51° 02′ 00″ S, 58° 55′ 00″ W to 51° 00′ 00″ S, 58° 53′ 00″ W. 121–130 m. Gear **OTC**. Bottom: fine dark sand. Two specimens.

St. WS 76. 11. iii. 27. 51° 00′ 00″ S, 62° 02′ 30″ W. From 51° 00′ 00″ S, 62° 00′ 00″ W to 51° 00′ 00″ S, 62° 04′ 36″ W. 207–205 m. Gear **OTC**. Bottom: fine dark sand. One specimen.

St. WS 88. 6. iv. 27. 54° 00′ 00″ S, 64° 57′ 30″ W. From 54° 00′ 00″ S, 65° 00′ 00″ W to 54° 00′ 00″ S, 64° 55′ 00″ W. 118 m. Gear **OTC**. Bottom: sand, shell and stones. One specimen.

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. From 49° 00′ 00″ S, 62° 00′ 00″ W to 49° 01′ 00″, 61° 56′ 00″ W. 146–145 m. Gear **OTC**. Bottom: sand, gravel and stones. Three specimens.

St. WS 109. 26. iv. 27. 50° 18′ 48″ S, 58° 28′ 30″ W. From 50° 19′ 00″ S, 58° 27′ 00″ W to 50° 18′ 36″ S, 58° 30′ 00″ W. 145 m. Gear **OTC**. Bottom: fine dark sand. One specimen.

St. MS 14. 17. ii. 25. From 1·5 miles SE × S to 1·5 miles S ½° W of Sappho Point, East Cumberland Bay, South Georgia. 190–110 m. Gear **DS**. Five specimens.

St. MS 68. 2. iii. 25. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. Six specimens.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. 9¼ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **BTS**. One specimen.

Remarks. A clearly defined species. The elytra are smooth except for a small patch of minute tubercles. Dorsal bristles lightly striated; ventral long and clearly bidentate: the upper ventral bristles have the toothing continued much further down the shaft than the rest. The elytra are often speckled with small dark spots.

Harmothoë spinosa, Kinberg.

Ehlers, 1913, p. 438, pl. xxvi, figs. 1–12.
Bergström, 1916, p. 284, pl. ii, figs. 5–6; pl. iii, figs. 1–4.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Eight specimens.

St. 48. 3. v. 26. 8·3 miles N 53° E of William Point Beacon, Port William, Falkland Island. 105–115 m. Gear **OTL**. Bottom: sand and shell. One specimen.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. Eight specimens.

St. 52. 5. v. 26. Port William, East Falkland Island. 7·4 cables N 17° E of Navy Point. 17 m. Gear **LH**. One specimen.

St. 53. 12. v. 26. Port Stanley, East Falkland Island. Hulk of "Great Britain." 0–2 m. Gear **RM**. Fifty-one specimens among kelp.

St. 55. 16. v. 26. Entrance to Port Stanley, East Falkland Island. 2 cables S 24° E of Navy Point. 10–16 m. Gear **BTS**. Three specimens.

St. 57. 16. v. 26. Port William, East Falkland Island. 5½ cables S 20° W of Sparrow Point. 15 m. Gear **BTS**. One specimen.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. Fourteen specimens.

St. 141. 29. xii. 26. East Cumberland Bay, South Georgia, 200 yards from shore, under Mount Duse. 17–27 m. Gear **BTS**. Bottom: mud. Three specimens.

St. 145. 7. i. 27. Stromness Harbour, South Georgia. Between Grass Island and Tonsberg Point. 26–35 m. Gear **BTS**. Fifteen specimens.

St. 146. 8. i. 27. 53° 48′ 00″ S, 35° 37′ 30″ W. 728 m. Gear **DLH**. Bottom: rock. One specimen.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stones, rock. One specimen.

St. 163. 17. ii. 27. Paul Harbour, Signy Island, South Orkneys. 18–27 m. Gear **BTS**. Four specimens.

St. 164. 18. ii. 27. East end of Normanna Strait, South Orkneys, near Cape Hansen, Coronation Island. 24–36 m. Gear **BTS**. Four young specimens.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. One specimen.

St. 177. 5. iii. 27. 27 miles SW of Deception Island, South Shetlands. 63° 17′ 30″ S, 61° 17′ 00″ W. 1080 m. Gear **DLH**. Bottom: mud, coarse sand and stones. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 126–315 m. Gear **DLH** and **NRL**. Bottom: mud, rock and stones. One specimen.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear **DLH**. Bottom: mud and stones. One specimen.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear **BTS**. Bottom: mud and sand. Five specimens.

St. WS 56. 14. i. 27. Larsen Harbour, Drygalski Fjord, South Georgia. From kelp roots, 2 m. Six specimens.

St. WS 62. 19. i. 27. Wilson Harbour, South Georgia. 15–45 m. Gear **BTS**. One specimen.

St. WS 72. 5. iii. 27. 51° 07′ 00″ S, 57° 34′ 00″ W. 95 m. Gear **OTC**. Bottom: sand and shell. Three specimens.

St. WS 73. 6. iii. 27. 51° 01′ 00″ S, 58° 54′ 00″ W. From 51° 02′ 00″ S, 58° 55′ 00″ W to 51° 00′ 00″ S, 58° 53′ 00″ W. 121–130 m. Gear **OTC**. Bottom: fine dark sand. One specimen from a Tubularian colony.

St. WS 76. 11. iii. 27. 51° 00′ 00″ S, 62° 02′ 30″ W. From 51° 00′ 00″ S, 62° 00′ 00″ W to 51° 00′ 00″ S, 62° 04′ 36″ W. 207–205 m. Gear **OTC**. Bottom: fine dark sand. Two specimens.

St. WS 77. 12. iii. 27. 51° 01′ 00″ S, 66° 31′ 30″ W. From 51° 00′ 00″ S, 66° 30′ 00″ W to 51° 02′ 00″ S, 66° 33′ 00″ W. 110–113 m. Gear **OTC**. Bottom: coarse dark sand. One specimen.

St. WS 79. 13. iii. 27. 51° 01′ 30″ S, 64° 59′ 30″ W. From 51° 00′ 00″ S, 65° 00′ 00″ W to 51° 03′ 00″ S, 64° 59′ 00″ W. 132 m. Gear **N 7–T**. Bottom: fine dark sand. One specimen.

St. WS 80. 14. iii. 27. 50° 57′ 00″ S, 63° 37′ 30″ W. From 50° 58′ 00″ S, 63° 39′ 00″ W to 50° 55′ 30″ S, 63° 36′ 00″ W. 152–156 m. Gear **OTC**. Bottom: fine dark sand. One specimen.

St. WS 84. 24. iii. 27. $7\frac{1}{2}$ miles S. 9° W of Sea Lion Island, East Falkland Island. From 52° 33′ 00″ S, 59° 08′ 00″ W to 52° 34′ 30″ S, 59° 11′ 00″ W. 75–74 m. Gear **OTC**. Bottom: coarse sand, shell and stones. Four specimens.

St. WS 85. 25. iii. 27. 8 miles S 66° E of Lively Island, East Falkland Island. From 52° 09′ 00″ S, 58° 14′ 00″ W to 52° 08′ 00″, 58° 09′ 00″ W. 79 m. Gear **OTC**. Bottom: sand and shell. One specimen.

St. WS 93. 9. iv. 27. 7 miles S 80° W of Beaver Island, West Falkland Island. From 51° 51′ 00″ S, 61° 30′ 00″ W to 51° 54′ 00″ S, 61° 30′ 00″ W. 133–130 m. Gear **OTC**. Bottom: grey sand. Four specimens.

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. From 49° 00′ 00″ S, 62° 00′ 00″ W to 49° 01′ 00″ S, 61° 56′ 00″ W. 146–145 m. Gear **OTC**. Bottom: sand, gravel and stones. Four specimens.

St. MS 6. 12. ii. 25. East Cumberland Bay, South Georgia. $\frac{1}{4}$ mile S of Hope Point to $1\frac{1}{4}$ cables S × E of King Edward Point Light. 24–30 m. Gear **BTS**. Five specimens.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S $\frac{1}{2}$ E to $8\frac{1}{2}$ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. Five specimens.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. $9\frac{1}{4}$ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **BTS**. Four specimens.

REMARKS. Bergström has well figured the variations in the elytra of this very abundant Antarctic species. He treats Willey's *H. spinosa* var. *lagiscoides* as a separate species. I have included examples of Willey's variety within *H. spinosa*.

Harmothoë exanthema (Grube).

Bergström, 1916, p. 287, pl. iii, fig. 5.

St. 53. 12. v. 26. Port Stanley, East Falkland Island. Hulk of "Great Britain." 0–2 m. Gear **RM**. Five specimens.

St. 56. 16. v. 26. Sparrow Cove, Port William, East Falkland Island. $1\frac{1}{2}$ cables N 50° E of Sparrow Point. $10\frac{1}{2}$–16 m. Gear **BTS**. Three specimens.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. Four specimens.

St. WS 79. 13. iii. 27. 51° 01′ 30″ S, 64° 59′ 30″ W. From 51° 00′ 00″ S, 65° 00′ 00″ W to 51° 03′ 00″ S, 64° 59′ 00″ W. 132–131 m. Gear **OTC**. Bottom: fine dark sand. One specimen.

St. WS 88. 6. iv. 27. 54° 00′ 00″ S, 64° 57′ 30″ W. From 54° 00′ 00″ S, 65° 00′ 00″ W to 54° 00′ 00″ S, 64° 55′ 00″ W. 118 m. Gear **OTC**. Bottom: sand, shell and stone. Five specimens.

REMARKS. I have nothing to add to what is already known of this species. The elytra have large stalked tubercles surmounted by a papilla, which is sometimes absent. The ventral bristles are both unidentate and bidentate.

Harmothoë anderssoni, Bergström.

Bergström, 1916, p. 286, pl. iii, fig. 6; pl. iv, figs. 8–10.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **N 4–T**. Bottom: green mud and sand. One specimen.

REMARKS. This specimen corresponds closely to Bergström's description. The elytra are ciliated and have tubercles with jagged tips. Some of the upper ventral bristles have scales on the blade as well as toothed edges: they are unidentate.

This is a quite different species from *H. hirsuta*, Johnson, in which the elytra are areolated and the ventral bristles bidentate.

Harmothoë crosetensis (McIntosh).

Lagisca crosetensis, McIntosh, 1885, pp. 88–89, pl. viii, fig. 6; pl. xiii, fig. 2; pl. xviii, fig. 7; pl. xi A, figs. 4–6.
Harmothoë crosetensis, Bergström, 1916, p. 284, pl. ii, fig. 4.
Harmothoë crosetensis, Ehlers, 1913, p. 442, pl. xxvii, figs. 1–4.

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa, Basin of H.M. Dockyard. 0–2 m. Gear **NH**. Four specimens.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH**. Bottom: rock. One specimen.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 126–315 m. Gear **DLH** and **NRL**. Bottom: mud, rock and stones. One specimen.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear **OTM**. Bottom: mud and stones. One specimen.

REMARKS. All the Antarctic specimens have long, numerous, pointed spines on the elytra and unidentate ventral bristles. The examples from the Cape have less sharply pointed elytral spines and bidentate ventral bristles. Willey (1902, p. 267) has created two varieties of this species, a var. *acuminata* for forms with acuminate elytral spines, such as his specimens from Cape Adare had, and a quite unnecessary var. *laciniata* for forms with elytral spines resembling those of the type specimen. All my Antarctic specimens belong to Willey's var. *acuminata*; on the other hand, Bergström states that his Antarctic specimens had elytral spines of the var. *laciniata* kind.

I am disinclined to attach much differential value to variations in the tips of the elytral spines, but I believe that there is a distinct varietal difference between the Antarctic forms and those from the South Temperate Zone, such as McIntosh's type from off the Crozet Islands and my specimens from the Cape, which have distinctly bidentate ventral bristles.

I suggest, therefore, that the Antarctic forms with unidentate ventral bristles should take the varietal name applied by Willey to his examples from Cape Adare and be called var. *acuminata*.

Harmothoë (Evarnella) impar Johnston, var. notialis, var. nov.

Harmothoë impar Johnston, Fauvel, 1923, p. 59, fig. 21 *a–f*.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. Two specimens.

DESCRIPTION. The one complete specimen measures 16 mm. by 3 mm. including the feet.

The head is not nearly so deeply grooved in front as in the northern form and the palps are proportionately much longer and more slender. The position of the eyes is as in Johnston's species. The median tentacle is lost and the laterals are very small. The tentacles and dorsal cirri are provided with long clavate papillae and the palps with very short truncated ones. An elytron (Fig. 13, *a*) from the second pair is all that remains, and this is kidney-shaped, sparsely fringed at the external border with a few small clavate papillae, and dotted all over its surface with small simple tubercles.

The foot and bristles are very close to those of *E. impar*. The dorsal (Fig. 13, *b*) bristles are numerous and strongly pectinated, and the superior ventral (Fig. 13, *c*) are

long, slender, toothed and with a delicate bidentate tip: more ventrally (Fig. 13, *d*) they become shorter and more expanded distally. The middle ventral chaetae are all clearly bidentate and only a few at the base of the foot lack the second tooth. The ventral cirri are short and smooth.

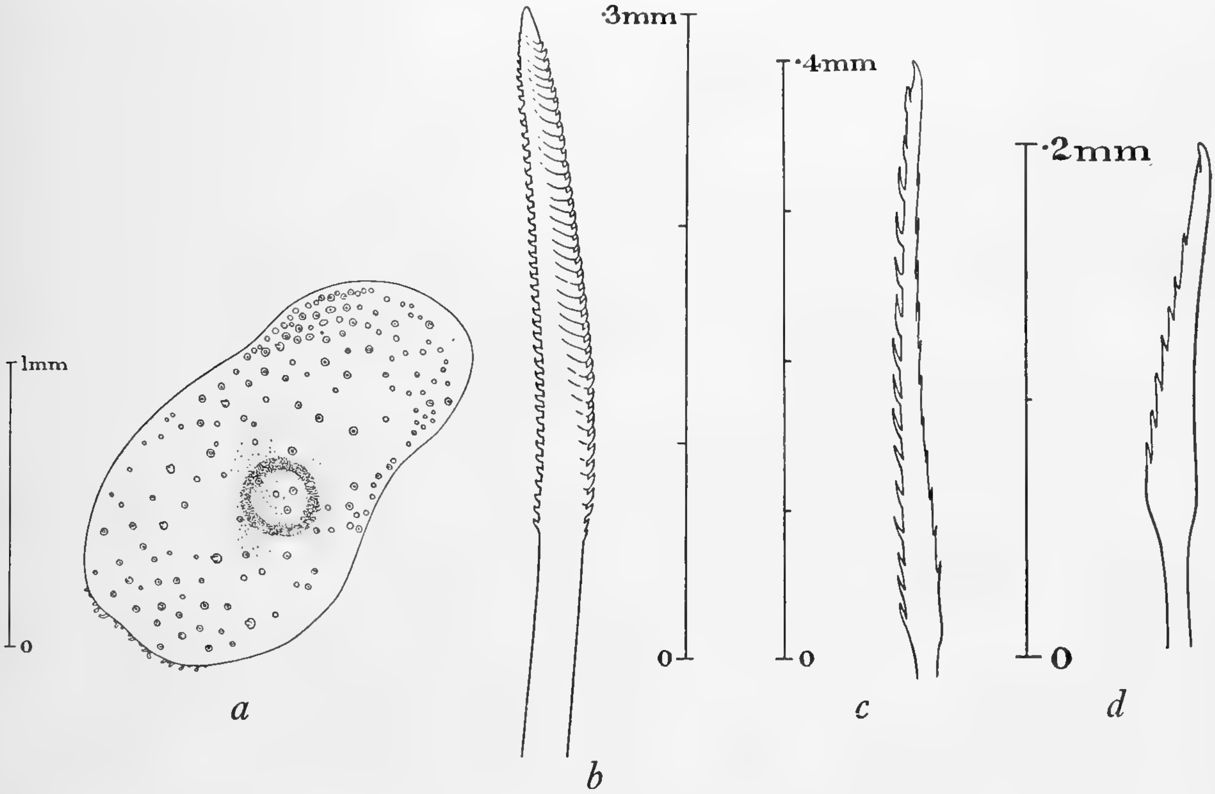


Fig. 13. *Harmothoë* (*Evarnella*) *impar*, var. *notialis*.
a. Elytron. *b*. Dorsal bristle. *c*. Upper ventral bristle. *d*. Lower ventral bristle.

REMARKS. This variety differs from the typical form in the grooving of the head, the relative length of the palps and in the absence of a long fringe and large tubercles on the elytra. I have retained *Evarnella* as a sub-genus to include those forms in which there is a clear transition from the very slender, strongly toothed, superior ventral bristles to the broader, shorter, less spinous, inferior ventral bristles. *Evarne*, Malmgren, being preoccupied, *Evarnella*, Chamberlin, takes its place.

Harmothoë (Evarnella) kerguelensis (McIntosh).

Evarne kerguelensis, McIntosh, 1885, pp. 97–99, pl. vi, fig. 4; pl. xix, fig. 6; pl. vi A, figs. 12–14.

St. 126. 19. xii. 26. 53° 58′ 30″ S, 37° 08′ 00″ W. 100 m. Gear N 50 V. Bottom: coarse black sand and mud. (Net touched bottom.) One fragmentary specimen.

REMARKS. A small fragment with a harmothoid head; it has 16 chaetigers and measures 3 mm. by 2 mm. including the feet. All the elytra and appendages are lost, but the bristles agree closely with those of McIntosh's type. The dorsal bristles (Fig. 14, *a* and *b*)

are of the normal pectinated harmothoid kind; the superior ventral bristles (Fig. 14, *c*) are long and slender with two alternating rows of teeth, and the inferior ventral bristles (Fig. 14, *d*), more expanded towards the tip, appear quite smooth except under a very high magnification. They are all unidentate. The absence of a second tooth in the ventral bristles distinguishes this species from *H. impar* var. *notialis*.

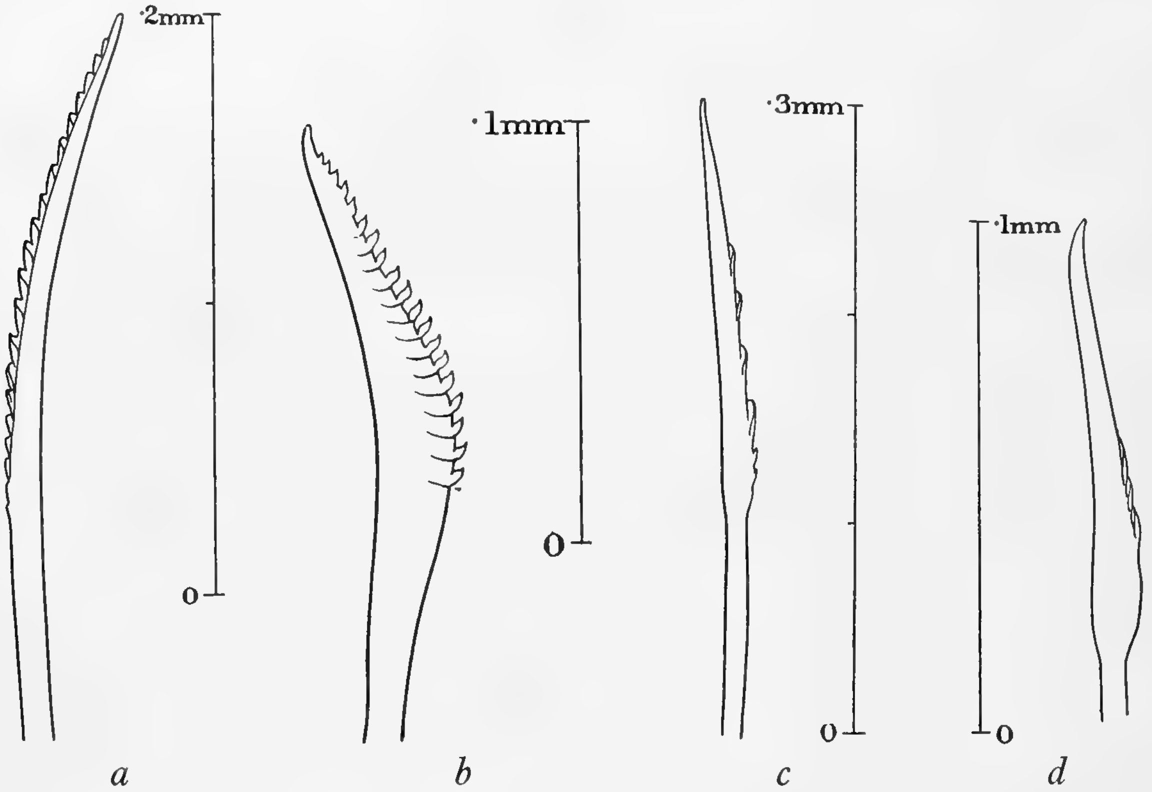


Fig. 14. *Harmothoë (Evarnella) kerguelensis.*
a. Dorsal bristle. *b*. Dorsal bristle. *c*. Upper ventral bristle. *d*. Lower ventral bristle.

Harmothoë (Barrukia) cristata (Willey).

Gattyana cristata, Willey, 1902, p. 268, pl. xliv, figs. 1–4.
Barrukia cristata, Bergström, 1916, p. 297, pl. v, figs. 7–9 and 14.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear OTL. Bottom: mud. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35 ′00″ W. 126–315 m. Gears DLH and NRL. Bottom: stones, mud and rock. One specimen.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear OTM. Bottom: mud and stones. Two specimens.

REMARKS. This species is recognisable by the dorsal bristles with hirsute tips. There is a row of median dorsal pads running the whole length of the body. The elytra have clavate tubercles with crenellated tops. The ventral chaetae are unidentate with two short rows of teeth on the shaft.

Harmothoë (Barrukia) curviseta, n.sp.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. One small fragment.

St. 186. 16. iii. 27. Fournier Bay, Anvers Island, Palmer Archipelago. 64° 25′ 30″ S, 63° 02′ 00″ W. 295 m. Gear **DLH**. Bottom: mud. One specimen.

Description. Two fragments, the larger of which is composed of 24 chaetigers and measures 30 mm. by 10 mm. including the feet: the colour is pale yellow in spirit.

The prostomium (Fig. 15, *a*) is as broad as long and divided by a median groove. The insertion of the lateral tentacles is ventral, but the prostomial peaks are not distinct. The eyes are small; the anterior pair, which is the larger, is far forward and laterally placed, so that it can scarcely be seen from above. The posterior are about in the middle of their half of the prostomium. The median tentaculophore is fairly stout and the median tentacle is lost. The lateral tentacles are small and hirsute, and the palps long, tapering and smooth. Laid along the back they reach to the 5th chaetiger. The tentacular cirri are missing. The first five chaetigers have conspicuous mid-dorsal tubercles, rounded in the first two chaetigers and transversely elongated in the remainder.

Elytrophores are present on the 1st, 3rd, 4th and every alternate segment up to the 22nd; the pseudo-elytrophores are very conspicuous and similar in appearance to the elytrophores. The elytra are dotted throughout with small tubercles with truncated and irregular tops, and except for a small area near the inner border there are long cilia both on the scale itself and along its free edges (Fig. 15, *b*).

The feet are biramous: the dorsal cirri are lost, but the dorsal cirrophores are large, dorso-ventrally flattened structures ending in a rounded knob for the cirrus: they lie above the foot, and their end falls just short of the tips of the dorsal bristles.

The mid-ventral edge of the dorsal chaeta sac is carried out to a point containing the aciculum, and the middle of the anterior lip of the ventral chaeta sac is similarly produced. The notopodium appears to have been twisted through a right angle, so that the aciculum is in the mid-ventral line, and the dorsal bristles are arranged in three superimposed rows parallel with the long axis of the body. The ventral bristles lie at right angles to the dorsal.

The upper row of dorsal bristles (Fig. 15, *c*) is shorter than the rest, strongly curved towards the tip, and provided with rows of prominent pectinae on their convex side. The tips are devoid of hairs. Similar bristles are found in Willey's *Gattyana cristata* from Franklin Island, the genotype of *Barrukia*. The remaining two rows (Fig. 15, *d*) of dorsal bristles are lightly pectinated, and end in hairy tips, the "setae penicillatae" of Bergström.

The ventral bristles (Fig. 15, *e*) are slightly more slender than the dorsal, and in place of the usual rows of teeth, there are two short series of two to three teeth. One of these series is always seen lying along the middle of the shaft and the other to its right side. The arrangement is not unlike that figured by Bergström (1916, Pl. v, fig. 9) for *Barrukia*

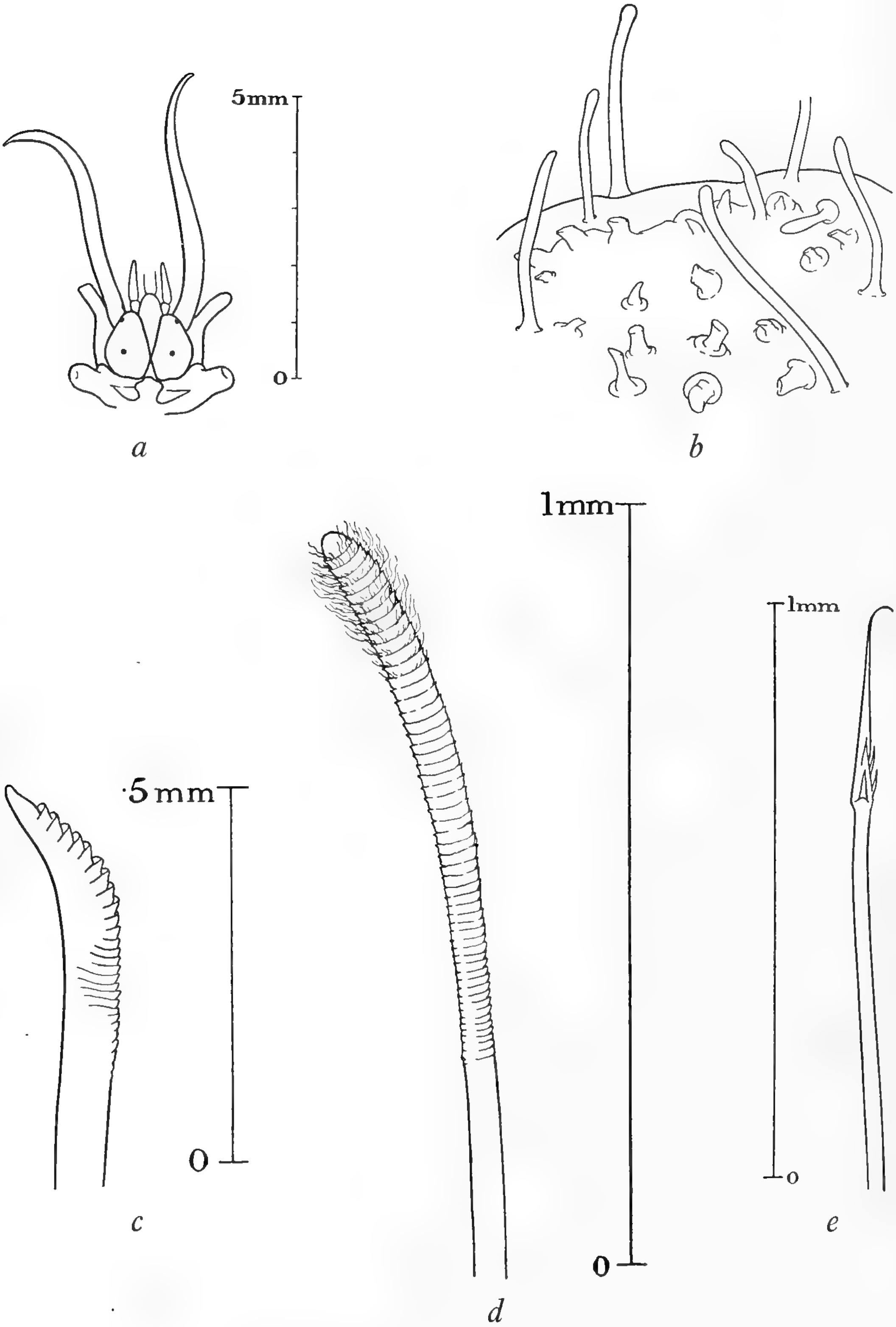


Fig. 15. *Barrukia curviseta*.
a. Head. *b*. Part of an elytron. *c*. Upper dorsal bristle. *d*. Lower dorsal bristle. *e*. Ventral bristle.

cristata. The ventral chaetae are prolonged into very fine delicate flagelliform tips which curl over in the shape of a hook. The extent to which the tips are bent over varies widely and a few bristles are without the curving of the tip. The ventral cirri are very small: they are attached to stout bulbous cirrophores.

REMARKS: I have attributed these fragments to the sub-genus *Barrukia* on the ground of the presence of dorsal "setae penicillatae." There are other characters, however, in which they resemble the genotype, the presence of the median dorsal tubercles, the shape of the dorsal cirrophores and of the feet. They differ from *Barrukia cristata* in the number of median dorsal tubercles, in the presence of long curved flagelliform tips to the ventral chaetae, and in the sculpturing of the elytra.

Genus **Antinoë**, Kinberg

Antinoë pelagica, n.sp.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. Bottom. 238–270 m. Gear **NCS–T**. One specimen.

St. SS 18. 15. xii. 27. 54° 58′ S, 27° 32′ W. 50–0 m. Gear **N 70 V**. One specimen.

DESCRIPTION. The body is slender and delicate. The complete specimen measures 11 mm. by 1·5 mm. without the feet: the measurement from tip to tip of the bristles is 6 mm. There are about 35 chaetigers and 15 pairs of elytra, which completely cover the body up to the pygidium. The elytra are faintly touched with brown on their edges; otherwise there is no colour.

The head (Fig. 16, *a*) is broader than long and deeply incised in front. The lateral tentacles are inserted ventrally. There are two pairs of eyes, of which the anterior is situated laterally and half-way down the head, and the posterior at the outer corners. The median tentacle is very long, reaching to the 8th chaetiger when laid along the back, and the lateral tentacles are extremely small. The palps are very slender and slightly longer than the median tentacle, which itself is longer than the tentacular cirri. The dorsal cirri are long and reach to the tips of the bristles, and the ventral cirri just reach to the end of the feet. The tentacles and cirri are hirsute, but the palps appear smooth.

The first pair of elytra is rounded, and the remainder are oval. Around the outer edge (Fig. 16, *b*) are a few sparse cilia, and the outer half of the scale is thinly dotted with small conical tubercles.

The feet (Fig. 16, *c*) are biramous and harmothoid in type, with long sheathed acicula protruding from both branches. The dorsal bundle consists of a number of backwardly curved scaly bristles (Fig. 16, *d*); just above the aciculum there are two chaetae that differ slightly from the rest: one (Fig. 16, *e*) is unusually broad and short, with its end projecting a short distance from the chaeta sac, and the other is of the same kind as the rest of the dorsal bristles but larger (Fig. 16, *f*) in all dimensions. All the dorsal bristles have a smooth tip.

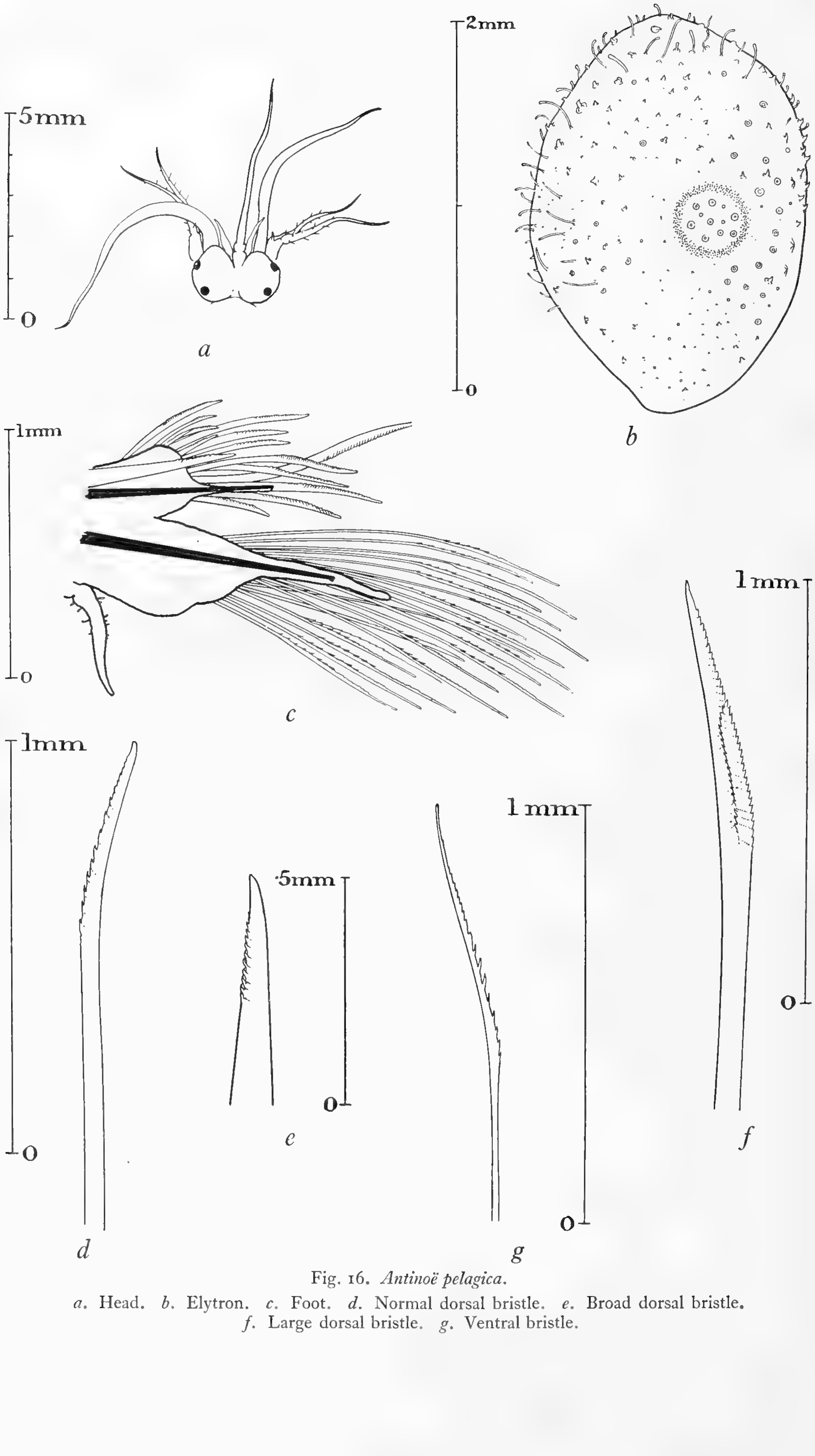


Fig. 16. *Antinoë pelagica.*
a. Head. *b.* Elytron. *c.* Foot. *d.* Normal dorsal bristle. *e.* Broad dorsal bristle. *f.* Large dorsal bristle. *g.* Ventral bristle.

The ventral bristles (Fig. 16, *g*) are about twice the length of the dorsal, and slender, with smooth unidentate tips and fine spirally arranged whorls of teeth going up the shaft. There is a pair of long pygidial styles.

REMARKS. This pelagic polynoid has much in common with *Herdmanella gracilis*, Ehlers (Ehlers, 1908, p. 44). The shape of the head appears to be similar, and there are great resemblances in the structure of the bristles. In Ehlers' species the lateral tentacles are relatively longer, and there are only eight pairs of elytra. It is possible that *H. gracilis* may be a young stage of the present species, just as the present species is probably the pelagic phase of some bottom living form.

I have attributed this example to the genus *Antinoë* on the ground of the fine hairlike ventral bristles.

Antinoë setobarba, n.sp.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear OTM. Bottom: mud and stones. One specimen.

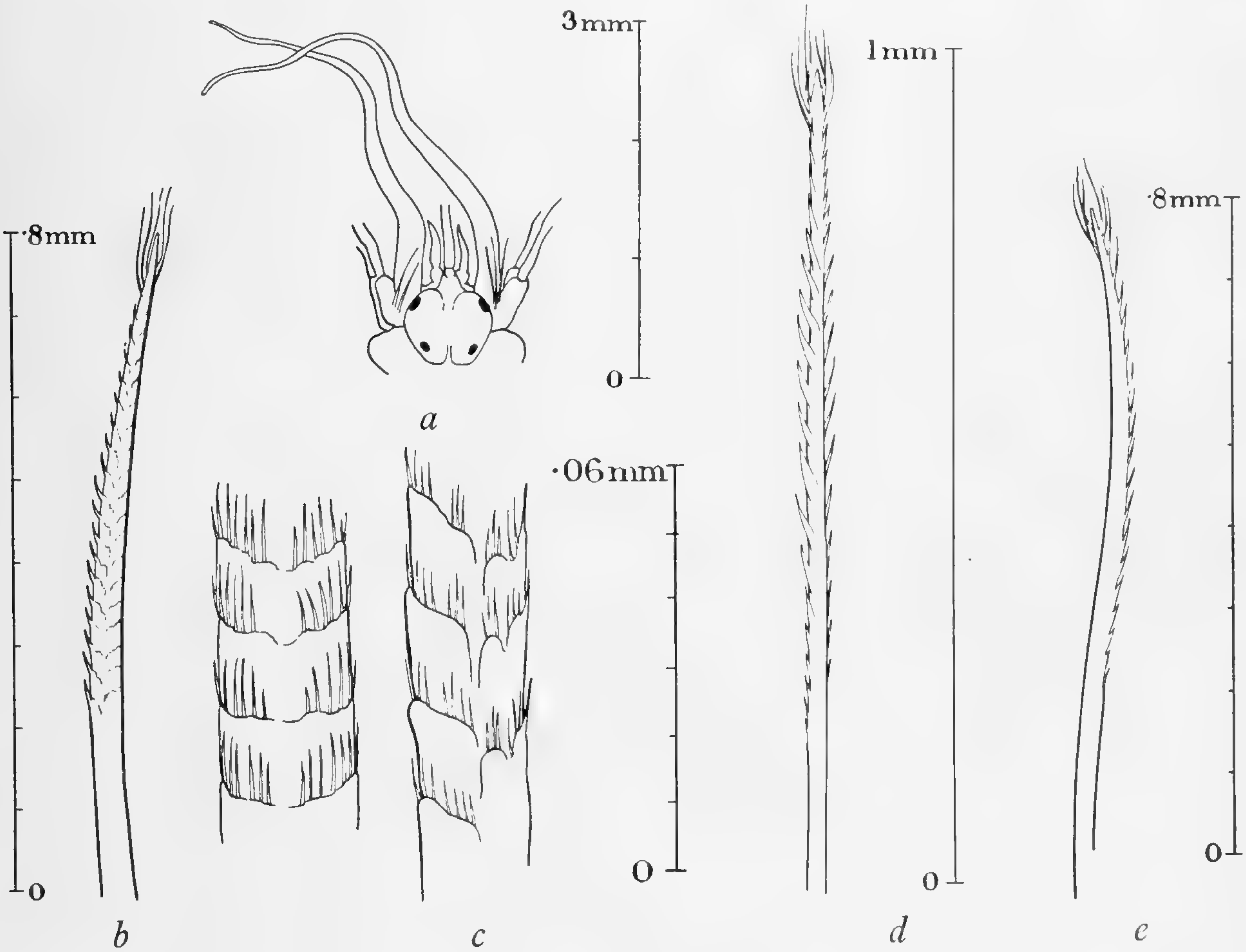


Fig. 17. *Antinoë setobarba*.
a. Head. *b*. Dorsal bristle. *c*. Part of dorsal bristle highly magnified. *d*. Ventral bristle. *e*. Ventral bristle.

DESCRIPTION. The measurement is 21 mm. by 3 mm. excluding the feet. In spirit the dorsum is black merging into grey at the hinder end, except for the elytrophores and pseudoelytrophores which are white. The median tentaculophore is marked with chestnut brown, and there are two patches of this colour below the lateral tentacles.

The prostomium (Fig. 17, *a*) is subrectangular and divided by a median groove. The eyes are small, and the front pair is near the anterior lateral edges of the prostomium; the hinder pair is near the posterior lateral edges. There is a stout median tentaculophore, by the sides of which are the two inconspicuous prostomial peaks. The lateral tentacles are inserted ventrally, and are very small. The palps are long, smooth and tapering. The median tentacle and all the tentacular cirri except one are lost; this cirrus is papillose.

There are 15 elytrophores, and all the elytra are lost; behind the hindermost elytrophore are only four chaetigers. The dorsal cirri are all lost, and the cirrophores are placed low down on the feet just above the dorsal bristles. All the cirrigerous segments have small pad-like pseudoelytrophores.

The structure of the feet is harmothoid in character. The dorsal chaetae (Fig. 17, *b* and *c*) are numerous with rather irregular rows of very fine scales, and end in a bearded tip. The aciculum is mid-ventral in position.

The ventral chaetae (Fig. 17, *d* and *e*) are also numerous, more slender than the dorsal, with two rows of teeth and a fine unidentate tip covered with a number of delicate hairs. The ventral cirri are short and very slender.

REMARKS. This species combines the penicillate dorsal chaetae, which distinguish Bergström's *Barrukia*, with filamentous ventral chaetae very like those of his *Austrolaenilla antarctica*. The ventral bristles of *A. setobarba* are unidentate, and those of Bergström's species are bidentate.

I know of no other Polynoid that has bearded tips to both its dorsal and its ventral chaetae.

Antinoë antarctica (Bergström).

Austrolaenilla antarctica, Bergström, 1916, pp. 291–294, pl. iii, fig. 8; pl. v, figs. 1 and 2.

St. 29. 16. iii. 26. West Cumberland Bay, South Georgia. 5·9 miles S 51° W of Jason Light. 23 m. Gear DC. Bottom: mud and stones. One specimen.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear N 7–T. Bottom: grey mud. Two specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear OTL. Bottom: grey mud. Sixteen specimens.

St. 123. 15. xii. 26. Off mouth of Cumberland Bay, South Georgia. From 4·1 miles N 54° E of Larsen Point to 1·2 miles S 62° W of Merton Rock. 230–250 m. Gear OTL. Bottom: grey mud. Six specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear OTL. Bottom: green mud and stones. One specimen.

St. 142. 30. xii. 26. East Cumberland Bay, South Georgia. From 54° 11′ 30″ S, 36° 35′ W to 54° 12′ S, 36° 29′ 30″ W. 88–273 m. Gear N 4–T. Bottom: mud. Five specimens.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N 76½° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear OTL. Bottom: mud. Four specimens.

St. MS 68. 2. iii. 25. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear NRL. Four specimens.

REMARKS. The prostomium (Fig. 18) is very broad and divided by a median groove. The peaks are not clearly defined. The eyes are very small and sometimes invisible. The median tentaculophore is very large, and all three tentaculophores are reddish brown. The elytra have small tubercles and slender clavate papillae. The dorsal chaetae are lightly pectinated, and the ventral are long, slender, unidentate and end in a hirsute tip.

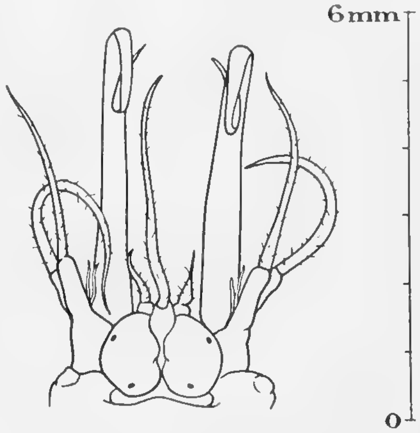


Fig. 18. *Antinoë antarctica*. Head.

I have already elsewhere (Monro, 1929, p. 162) given reasons for my opinion that *Austrolaenilla* should be regarded as a synonym of *Antinoë*, Kinberg, *sensu* McIntosh.

Antinoë epitoca n.sp.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola. From 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. 64–65 m. Gear OTL. Bottom: grey mud. One specimen.

DESCRIPTION. One specimen, incomplete posteriorly. There are 28 chaetigers and 14 pairs of elytrophores; the measurement is 29 mm. by 3 mm. without the feet.

The prostomium (Fig. 19, *a*) is broader than long and deeply incised in front. There are two pairs of eyes of which the anterior is on the front apexes and the posterior at the hinder corners of the head. There are no peaks, their place being taken by the anterior eyes. The median tentacle has a very large tentaculophore set between the anterior eyes, and a long style about three times the length of the head. The lateral tentacles are small, about the length of the head, and their tentaculophores are hidden from above by the eyes and median tentaculophore. The palps are long, reaching back along the dorsum to the 7th chaetiger and the tentacular cirri are about twice the length of the lateral tentacles. Neither the appendages of the head nor the cirri are hirsute.

The elytra are all lost, but the first 14 pairs of elytrophores are arranged as in *Harmothoë*.

The dorsal cirrophores are large inflated-looking structures, which reach to the end of the feet, and the dorsal cirri extend well beyond the tips of the bristles. The elytrophores also have a somewhat inflated appearance and are about half the length of the cirrophores. The feet (Fig. 19, *b*) are biramous.

The dorsal ramus is on the upper and anterior face of the neuropodium, and consists of a rounded chaeta-sac carried out into a point by a long sheathed aciculum.

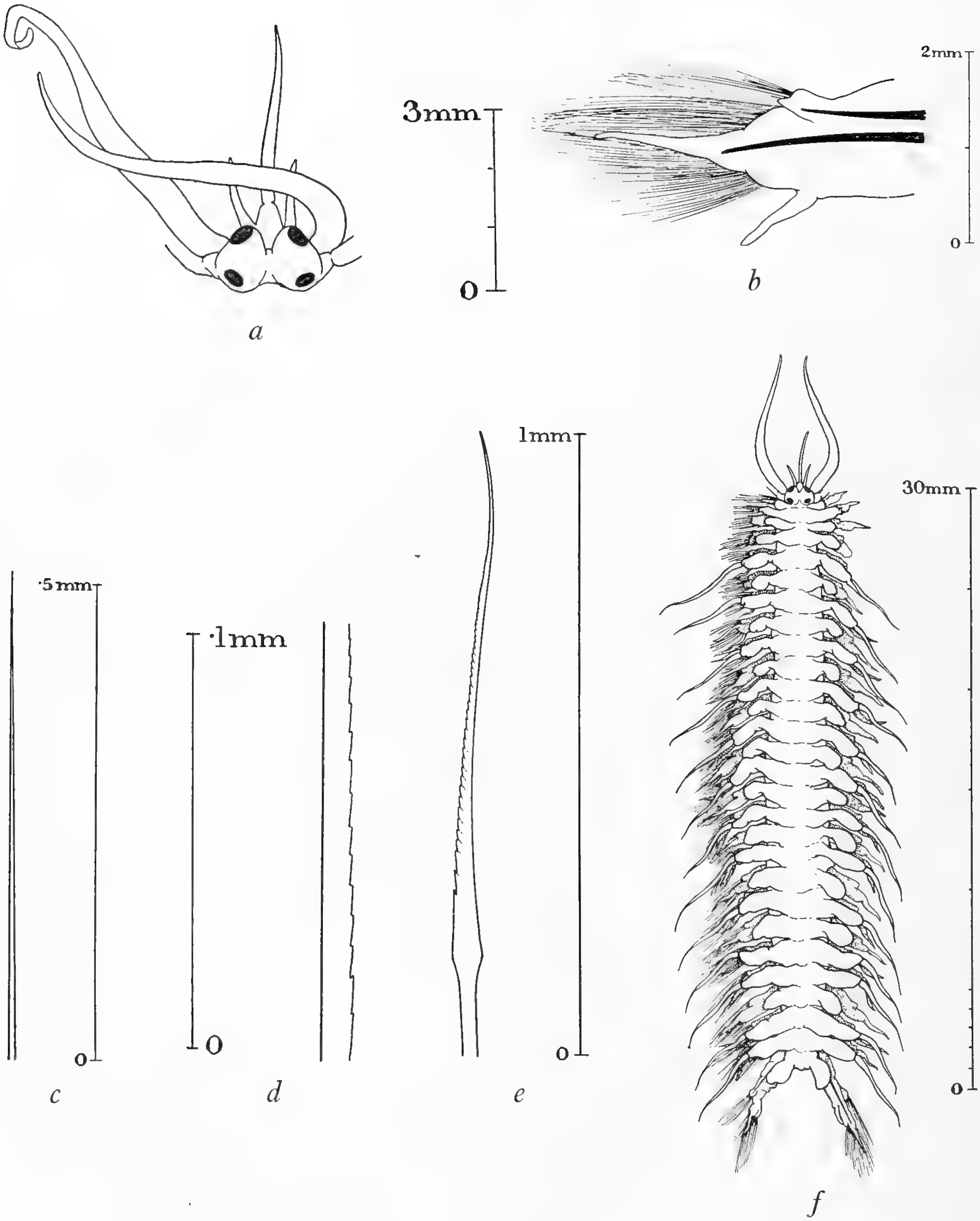


Fig. 19. *Antinoë epitoca.*

a. Head. *b*. Foot. *c*. Dorsal bristle. *d*. Part of dorsal bristle highly magnified. *e*. Ventral bristle. *f*. Entire animal seen from above.

The dorsal (Fig. 19, *c*) bristles are numerous and exceedingly fine capillaries, which appear to be quite smooth, but under a very high magnification minute serrations (Fig. 19, *d*) can be detected on one side of the blade.

The ventral bristle bundle is contained between two vertical lips, the anterior of which is produced into an extremely long cirriform process, almost reaching to the tips of the bristles. The ventral bristles (Fig. 19, *e*), although coarser than the dorsal, are very long and slender, and end in fine hair-like tips. They carry rows of delicate closely set teeth. The ventral cirri are short, just reaching to the lip of the chaeta sac. The example (Fig. 19, *f*) is a ripe female, filled with ova.

REMARKS. I find this specimen very puzzling. It was apparently obtained from the bottom of the sea, and the head and the sturdy character of the body are not those of a pelagic form: on the other hand, the large inflated-looking cirrophores and the long very delicate bristles recall the free-swimming species. Furthermore, I know no genus in which the bristles of both rami of the foot are fine capillaries, the dorsal almost smooth and finer than the ventral. I have provisionally attributed it to *Antinoë* on account of its ventral bristles, for I am unwilling to base a new genus on an incomplete specimen.

The example is full of eggs, and I think it very possible that it is undergoing some sexual change, involving the temporary adoption of the pelagic habit.

Family ACOETIDAE

Genus **Eupanthalis**, McIntosh

Eupanthalis tubifex (Ehlers).

Euarche tubifex, Ehlers, 1887, p. 54, pl. xii, figs. 1–7; pl. xiii, fig. 1.
Eupanthalis tubifex, Augener, 1918, p. 125, pl. ii, fig. 20.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola. From 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. 64–65 m. Gear OTL. Bottom: grey mud. One specimen.

REMARKS. A large example, measuring 295 mm. by 10 mm. including the feet, of this species, described by Ehlers from the West Indies and by Augener from the Belgian Congo. Fauvel regards it as synonymous with the Mediterranean *E. kinbergi*, McIntosh, but this seems to me doubtful. Both in my specimen and in that figured by Ehlers the bristles are extremely short, while in all the Mediterranean examples seen by me they are fairly long and prominent.

Genus **Polyodontes**, Renier

Polyodontes mortenseni, Monro.

Monro, 1928, p. 569, figs. 19–24.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo. From 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. 58–67 m. Gear OTL. Bottom: mud and fine sand. One specimen.

REMARKS. An anterior fragment belonging to a young specimen. Neither the branchiae nor the bristles are as fully developed as in the type specimen from Panama. The skin is flaccid on top of the feet and definite branchial processes are hard to distinguish.

It seems probable that this species is identical with *P. bicolor*, Grube, described by Augener (1918, p. 119) from the West Coast of Africa. The finger-shaped process on the foot, which Augener was unable to interpret with certainty, is present in the Panama specimen and seems to be an undoubted branchia.

The globular extension of the skin of the ventral side of the pedal lobe of the first foot, which Augener figures and describes, is completely absent from my specimens.

Family SIGALIONIDAE

Genus **Euthalanessa**, Darboux

Euthalanessa dendrolepis (Claparède).

Fauvel, 1923, p. 114, fig. 42 *h–o*.
Euthalanessa insignis, Ehlers, 1908, p. 52, pl. i, figs. 10 and 12; pl. ii, figs. 1–9.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. 0·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. Two specimens.

REMARKS. Two small anterior fragments. The *Euthalanessa insignis*, Ehlers, from 35° 2′ S, 19° 58′ W seems to me to be indistinguishable from the European *E. dendrolepis*. On the other hand, the *E. insignis*, Ehlers, of Augener from the Gold Coast is a different species. According to Augener's account it has a third cirrus on the first segment. Gravier's *E. djiboutiensis* has the palps lying outside the first segment and apparently not fused with it. My specimens correspond in detail with Ehlers' description and figures.

Genus **Leanira**, Kinberg

Leanira incisa, Grube.

Augener, 1918, p. 107, with synonymy.
Sthenelais simplex, Ehlers, 1887, p. 60, pl. xiii, figs. 2 and 3; pl. xiv, figs. 1–6.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola. From 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. 64–65 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo. From 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. 58–67 m. Gear **OTL**. Bottom: mud and fine sand. Three specimens.

REMARKS. Four incomplete examples of this species, described by Grube and Ehlers from the West Indies and recorded by Augener from the Congo. In these specimens the ventral ramus of the feet bears in the middle one stylode of much greater length than the rest: this is not shown in Ehlers' figures.

Family PHYLLODOCIDAE

Genus **Eteone**, Savigny

Eteone sculpta, Ehlers.

Ehlers, 1901, p. 80, pl. viii, figs. 18–21.
Bergström, 1914, p. 191, text-fig. 71.

St. 145. 7. i. 27. Stromness Harbour, South Georgia. Between Grass Island and Tonsberg Point. 26–35 m. Gear **BTS**. One specimen.

St. 166. 19. ii. 27. SE Point of Paul Harbour, Signy Island, South Orkneys. Shore collection. One specimen.

St. WS 71. 23. ii. 27. 6 miles N 60° E of Cape Pembroke Light, East Falkland Island. 51° 38′ 00″ S, 57° 32′ 30″ W. 82 m. Gear **OTC**. Bottom: sand. One specimen.

.St. WS 84. 24. iii. 27. 7½ miles S 9° W of Sea Lion Island, East Falkland Island. From 52° 33′ 00″ S, 59° 08′ 00″ W to 52° 34′ 30″ S, 59° 11′ 00″ W. 75–74 m. Gear **OTC**. Bottom: coarse sand, shell and stones. One specimen.

St. WS 85. 25. iii. 27. 8 miles S 66° E of Lively Island, East Falkland Island. From 52° 09′ 00″ S, 58° 14′ 00″ W to 52° 08′ 00″ S, 58° 09′ 00″ W. 79 m. Gear **OTC**. Bottom: sand and shell. One specimen.

St. WS 88. 6. iv. 27. 54° 00′ 00″ S, 64° 57′ 30″ W. From 54° 00′ 00″ S, 65° 00′ 00″ W to 54° 00′ 00″ S, 64° 55′ 00″ W. 118 m. Gear **OTC**. Bottom: sand, shell and stones. Three specimens.

St. MS (?). 13. iv. 25. East Cumberland Bay, South Georgia. One specimen.

Remarks. The majority of examples are bright yellow with a dark brown transverse band in each segment. They correspond closely to Ehlers' *E. crassifolia* which Bergström identifies with *E. sculpta*.

The dorsal cirri are symmetrical, but I do not find their breadth invariably exceeding their length, as Bergström claims. Roughly speaking, the length and breadth are about the same.

The most easily appreciable difference between this species and *E. rubella* is that in the latter species the aciculum and chaeta-sac are considerably more prominent in relation to the cirri than they are in *E. sculpta*. Bergström's suggestion that *E. sculpta* is a variety of the Arctic *E. flava* seems to me sound.

Eteone aurantiaca, Schmarda.

Bergström, 1914, p. 201, text-fig. 76, with synonymy.

St. WS 65. 22. i. 27. Undine Harbour (North), South Georgia. With kelp root. One specimen.

Remarks. A small *Eteone*, which I attribute to this species on the ground of its short asymmetrical dorsal cirri.

Eteone rubella, Ehlers.

Ehlers, 1901, p. 80, pl. viii, figs. 18–21.
Bergström, 1914, p. 191, text-fig. 71.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N 76½° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. One specimen.

REMARKS. One specimen which probably belongs to this species. The body is pale yellow, and in the hinder part of the specimen the dorsal cirri are tinged with brown. I can find no trace of eyes. In other respects the example agrees with Ehlers' description. The anal cirri are two small rounded lobes. It differs from *E. aurantiaca* in that the dorsal cirri are symmetrical.

Genus **Phyllodoce**, Savigny

Phyllodoce patagonica (Kinberg).

Anaitides patagonica, Bergström, 1914, p. 147, text-fig. 46, with synonymy.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Four specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Three specimens.

St. 91. 8. ix. 26. 0·5 mile off Roman Rock, False Bay, South Africa. 35 m. Gear **NRL**. Bottom: sand. ? One specimen.

St. 141. 29. xii. 26. East Cumberland Bay, South Georgia, 200 yards from shore under Mount Duse. 17–27 m. Gear **BTS**. Bottom: mud. Three specimens.

St. 142. 30. xii. 26. East Cumberland Bay, South Georgia. From 54° 11′ 30″ S, 36° 35′ W to 54° 12′ S, 36° 29′ 30″ W. 88–273 m. Gear **N 4–T**. Bottom: mud. One specimen.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **N 4–T**. Bottom: green mud and sand. One specimen.

St. 145. 7. i. 27. Stromness Harbour, South Georgia. Between Grass Island and Tonsberg Point. 26–35 m. Gear **BTS**. Two specimens.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stones and rock. One specimen.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. One specimen.

St. 182. 14. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 21′ 00″ S, 62° 58′ 00″ W. 278–500 m. Gear **N 7–T**. Bottom: mud. One specimen.

St. MS (?). 13. iv. 25. East Cumberland Bay, South Georgia. Two specimens.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. $9\frac{1}{4}$ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **BTS**. One specimen.

REMARKS. I have followed Bergström in identifying *P. madeirensis* of Ehlers and Willey with *P. patagonica*. The specimen from the Cape has the papillae of the proboscis thinner and more foliaceous than have the more southern forms. Moreover, it has seven papillae in the middle line and eleven in the rest, whereas five and nine seem to be the more usual numbers for the Antarctic examples.

Phyllodoce (Anaitis) bowersi, Benham.

Phyllodoce bowersi, Benham, 1927, p. 77, pl. i, figs. 27–31.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. One specimen.

Remarks. This is an example of Benham's species from the Ross Sea. It has an orange stripe down the middle of the back. The differences in the length of the dorsal cirri of the three tentacular segments is not so great as Benham indicates. Otherwise this specimen corresponds in detail to Benham's description and figures. I have only one specimen, and I cannot without damaging it ascertain the tentacular formula.

Phyllodoce oculata, Ehlers.

Ehlers, 1887, p. 135, pl. xl, figs. 4–6.
Anaitides oculata, Bergström, 1914, p. 144, text-fig. 44.
Augener, 1918, p. 169.

St. 1. 16. xi. 25. Clarence Bay, Ascension Island. 7° 55′ 15″ S, 14° 25′ 00″ W. 16–27 m. Gear **NRM**. Bottom: coral, sand and shell. One specimen.

St. 4. 30. i. 26. Tristan da Cunha. 36° 55′ S, 12° 12′ W. 40 m. Gear **LH**. Two specimens.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. Two specimens.

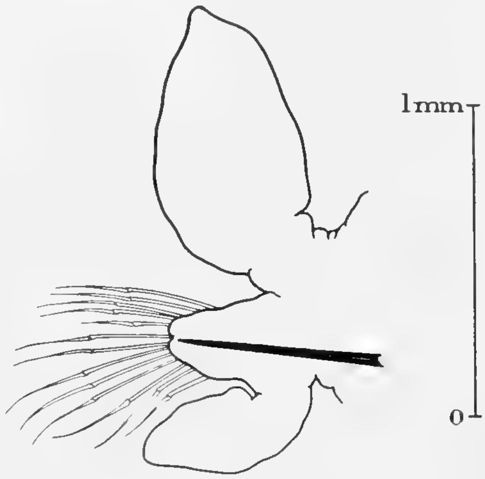


Fig. 20. *Phyllodoce oculata*. Middle foot.

Remarks. The head is rather long, equalling in length the first six segments. The first tentacular segment is incomplete dorsally, and the longest tentacular cirrus, when laid along the back, reaches to the 9th segment and not to the 14th, as in Ehlers' description. There are twelve rows of papillae with nine in each row.

At both ends of the body the dorsal cirri are considerably narrower and more symmetrical than they are in the middle of the body (Fig. 20); also the anterior ventral cirri are shorter and less pointed than they are in the rest of the body. The colour is a pale yellow without markings, but in one of the specimens the ventral surface of the posterior two-thirds of the body is a dull green. The range from the West Indies to Tristan da Cunha is a long one, but I cannot discover any differences of specific value between these specimens and those described from the former locality.

Phyllodoce longipes, Kinberg.

Kinberg, 1865, p. 241.
Ehlers, 1901, p. 72, pl. vii, figs. 1–4.
Bergström, 1914, p. 149, text-fig. 47.

St. 142. 30. xii. 26. East Cumberland Bay, South Georgia. From 54° 11′ 30″ S, 36° 35′ W to 54° 12′ S, 36° 29′ 30″ W. 88–273 m. Gear **N 4-T**. Bottom: mud. One specimen.

Description. This example has 140 segments, measures 110 mm. by 7 mm. including the feet, and is incomplete posteriorly. There is an iridescent blue band, wider in front

than behind, running down the middle of the back. The cordiform head with its median papilla has been figured by Ehlers: the eyes in my specimen are so much faded as to be only just indicated. This may have been caused by the fact that the specimen was removed in a dry condition from a faulty bottle.

The formula for the tentacular segments is as follows: $1 + B\frac{a1}{a1} + B\frac{a1}{aN}$.

The first tentacular segment is incomplete dorsally, and its cirrus and the thickened ventral cirrus of the second segment are both less than half the length of the other two tentacular cirri. The dorsal tentacular cirrus of the second segment reaches back to the 12th segment.

The foot (Fig. 21), with its small digitiform appendage at the end of the chaeta sac and the pointed end of the ventral cirrus, has been figured by Bergström and by Ehlers, but both these authors have overlooked one important fact. When the foot has been cleared, a very slender aciculum can be seen running up the dorsal cirrophore as in *Austrophyllum* and *Notophyllum*. The proboscis is unfortunately not everted.

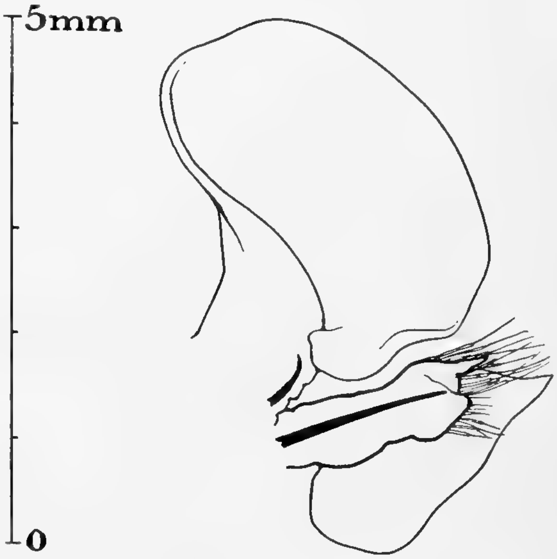


Fig. 21. *Phyllodoce longipes*. Middle foot.

REMARKS. This species has a foot very like that of *Notophyllum foliosum* as far as the dorsal ramus goes, but the head with its occipital papilla and no median tentacle is that of a *Phyllodoce*.

For uniformity's sake, I should make this species the type species of a new genus, but I suspect that, as our knowledge of this family increases, it will be found that a number of species on close investigation show vestiges of a biramous condition of the foot. I therefore retain its original name in spite of the fact that by generic definition *Phyllodoce* has uniramous feet.

This species seems to be very like *Phyllodoce macropapillosa*, St Joseph, from European waters (v. Fage et Legendre, 1927, p. 53, fig. 6), but no dorsal aciculum has been described for St Joseph's species.

Genus **Austrophyllum**, Bergström

Austrophyllum charcoti (Gravier).

Bergström, 1914, p. 119, text-fig. 30, with synonymy.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Three specimens.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stones and rock. One specimen.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear **OTM**. Bottom: mud and stones. Two specimens.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S $\frac{1}{2}$ E to 8$\frac{1}{2}$ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. One specimen.

REMARKS. The proboscis is not smooth distally, but the bands of papillae are continued to the apex as in Gravier's original description.

Genus **Genetyllis**, Malmgren

Genetyllis polyphylla (Ehlers).

Phyllodoce polyphylla, Ehlers, 1897, p. 26, pl. i, figs. 14–19.
Phyllodoce polyphylla, Gravier, 1911, p. 54, pl. i, figs. 9–11.
Genetyllis polyphylla, Bergström, 1914, p. 161, text-fig. 55.

St. 145. 7. i. 27. Stromness Harbour, South Georgia. Between Grass Island and Tonsberg Point. 26–35 m. Gear **BTS**. Two specimens.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 126–315 m. Gear **DLH** and **NRL**. Bottom: stones, mud and rock. Two specimens.

St. MS 14. 17. ii. 25. From 1·5 miles SE × S to 1·5 miles S $\frac{1}{2}$ W of Sappho Point, East Cumberland Bay, South Georgia. 190–110 m. Gear **DS**. One specimen.

REMARKS. Sts. 145 and 190 each yielded two small examples of this species. They are bright yellow with orange dorsal cirri.

From St. MS 14 was obtained an incubating specimen. It is curled upon itself to such an extent that accurate measurements are impossible, but it is approximately 20 mm. long by 1 mm. broad. Exactly as in Gravier's description of *Eteone gaini*, there is an envelope of dark brown parchmenty substance wrapped round the specimen, from which only the head and tail are free. Inside this envelope is a large number of larval phyllodocids, measuring about 1 mm. in length and having about 12 chaetigers.

Unfortunately the specimen is in bad condition and cannot be determined with certainty, but from the structure of the head and anterior segments and from the fragments of the feet which I was able to detach, I believe it to belong to this species.

Genus **Eulalia**, Oersted

Eulalia magalhaensis, Kinberg.

Steggoa magelhaensis, Bergström, 1914, p. 129, with synonymy.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 141. 29. xii. 26. East Cumberland Bay, South Georgia, 200 yards from shore under Mount Duse. 17–27 m. Gear **BTS**. Bottom: mud. Two specimens.

St. 145. 7. i. 27. Stromness Harbour, South Georgia. Between Grass Island and Tonsberg Point. 26–35 m. Gear **BTS**. One specimen.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear **BTS**. Bottom: mud and sand. Two specimens.

St. MS (?). 13. iv. 25. East Cumberland Bay, South Georgia. Two specimens.

REMARKS. Bergström has made this species the type of a new genus, *Steggoa*, on the ground of the foliaceous character of the ventral cirrus of the second tentacular segment, the absence of bristles in this segment, and the presence of a notopodial aciculum in the third tentacular segment. The species is easily distinguishable by the long and comparatively narrow dorsal cirrus.

Eulalia viridis (O. F. Müller).

Fauvel, 1923, p. 160, fig. 57 *a–h*, with synonymy.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. Ten specimens.

REMARKS. Ten specimens with very long and narrow dorsal cirri. The ventral cirrus of the second tentacular segment is moderately thickened and flattened, and betrays no trace of border. The three tentacular segments are clearly separated. Augener (1918, p. 174) does not figure the ventral cirrus of the second tentacular segment of his *Steggoa microcephala* (Clap.) from the Gulf of Guinea, and from his description his *S. microcephala* is scarcely to be distinguished from this species. Augener's *Eulalia viridis* var. *capensis*, Schm. from South-west Africa differs in having much broader dorsal cirri.

Eulalia anomalochaeta, n.sp.

St. 42. 1. iv. 26. Off mouth of Cumberland Bay, South Georgia. From 6·3 miles N 89° E of Jason Light to 4 miles N 39° E of Jason Light. 120–204 m. Gear **OTL**. Bottom: mud. Two specimens.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N 76½° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. One specimen.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 315 m. Gear **DLH**. Bottom: stones, mud and rock. One specimen.

DESCRIPTION. The average size is about 100 mm. by 4 mm. including the feet and the number of chaetigers is about 300. The body is long and vermiform and only slightly tapered at the ends. The body colour is a pale green with large segmental transverse bands, sometimes interrupted in the mid-dorsal line.

The feet and cirri are either dark brown or dark green. The prostomium (Fig. 22, *a*) is roughly rectangular in shape, and the eyes are set well back; these are oblong with crystalline centres. There are five tentacles, and the median is set in front of the eyes. The cirrus of the first tentacular segment is about half the length of the dorsal cirri of the remaining tentacular segments. These cirri, when laid along the back, reach to the 9th segment.

The ventral cirrus of the 2nd tentacular segment is slightly flattened and a little longer than the cirrus of the 1st tentacular segment. The remaining tentacular cirri are all digitiform.

Expressed in Bergström's formula the tentacular segments are as follows:

$$1 + B\frac{1}{a1} + B\frac{1}{aN}.$$

All the everted area of the proboscis is covered with a sort of thick fur of conical papillae.

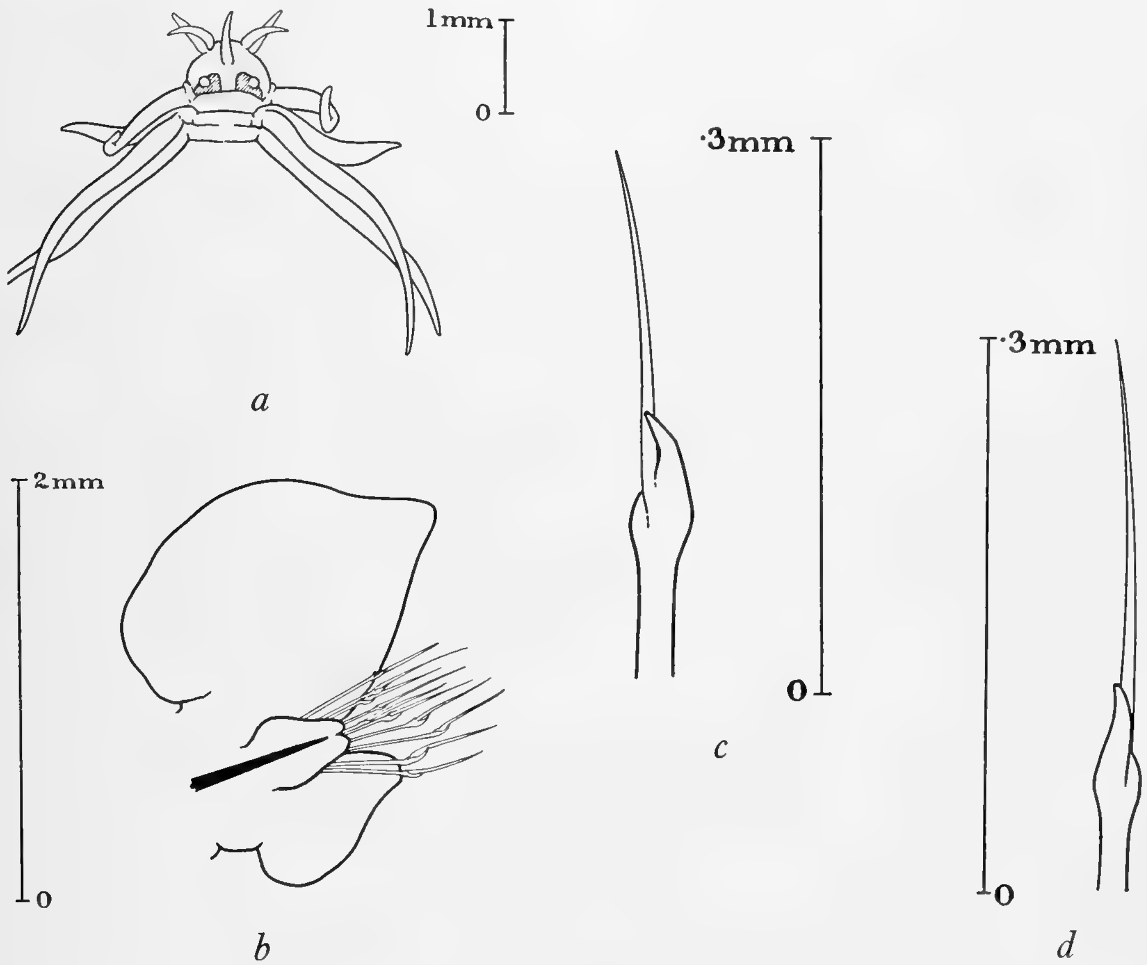


Fig. 22. *Eulalia anomalochaeta.*

a. Head. *b.* Middle foot. *c.* Heterogomph bristle. *d.* Heterogomph bristle.

The feet (Fig. 22, *b*) are bilobed, and the dorsal cirri are large and cordiform, almost as broad as long, and sometimes apparently asymmetrical. The ventral cirri are about one-third the size of the dorsal, rather asymmetrical and with blunted ends. The bristles (Fig. 22, *c* and *d*) are remarkable. They are very strongly heterogomph, and the "hilt" ends in a large hook, below which is the articulation for the very small delicately hirsute blade. The pygidium consists of a simple rounded lobe.

REMARKS. I believe these markedly heterogomph bristles to be distinctive of this species, for I know no *Eulalia* with chaetae at all resembling them.

Eulalia subulifera (Ehlers).

Hypoeulalia subulifera, Bergström, 1914, p. 167, text-fig. 58, with synonymy.

Cumberland Bay, South Georgia. Three specimens.

REMARKS. As in Gravier's specimens, the pigment is more diffuse than as described by Ehlers. The proboscis is thickly covered with small papillae. Bergström has established the genus *Hypoeulalia* to include this species and *E. bilineata* (Johnston), on the ground of the fusion of the first tentacular segment with the head.

Eulalia picta, Kinberg.

Notalia picta, Bergström, 1914, p. 127, text-fig. 34, with synonymy.

St. 56. 16. v. 26. Sparrow Cove, Port William, East Falkland Island. $1\frac{1}{2}$ cables N 50° E of Sparrow Point. $10\frac{1}{2}$–16 m. Gear **BTS**. One specimen.

St. 57. 16. v. 26. Port William, East Falkland Island. $5\frac{1}{2}$ cables S 20° W of Sparrow Point. 15 m. Gear **BTS**. One specimen.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N $76\frac{1}{2}$° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. Five specimens.

St. 156. 20. i. 27. 53° 51′ 00″ S, 36° 21′ 30″ W. 200–236 m. Gear **DLH**. Bottom: rock. One specimen.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. $9\frac{1}{4}$ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **BTS**. One specimen.

REMARKS. On either side of each chaetiger is a black spot just above the dorsal cirrus, and black spots are sometimes discernible in a similar position on the undersurface below the ventral cirri. Two of the examples have the proboscis only partly protruded, and it then has the misleading appearance of being covered with large papillae, which are what Bergström describes as *Kontraktionswarzen*.

Genus **Lopadorhynchus**, Grube

Lopadorhynchus brevis, Grube.

Fauvel, 1923, p. 184, fig. 69 *k*.
Ehlers, 1913, p. 463.
Lopadorhynchus nans, Chamberlin, 1919, p. 116, pl. xvii, figs. 1–5.

St. 273. 31. vii. 27. 9° 38′ 00″ S, 12° 42′ 30″ E. 200–230 (–0) m. Gear **TYF**. One specimen.

REMARKS. This specimen from St. 273 measures 12 mm. by 4 mm. including the feet and has about 27 chaetigers. The head is slightly damaged, and I can find no trace of eyes. The head is cut off squarely in front, and of the tentacles the upper pair is longer than the lower. The three pairs of short stout tentacular cirri lie at the side of the head and partly conceal the tentacles. The first three pairs of feet are only slightly shorter and thicker than those that follow, for the feet gradually lengthen out and become more slender up to the 6th chaetiger. The first three pairs of feet have neither ventral cirri nor compound chaetae; the remainder have a few simple bristles in addition to the compound chaetae.

Lopadorhynchus krohnii (Clap.), var. **simplex**, var. nov.

Lopadorhynchus krohnii, Fauvel, 1923, p. 185, figs. 68 *a–d*, with synonymy.

St. 104. 31. x. 26. 41° 33′ 30″ S, 17° 58′ 00″ W. 56 (–0) m. Gear **N 100 H**. Two specimens.

St. 267. 23. vii. 27. 24° 31′ 00″ S, 12° 15′ 30″ E. 450–550 (–0) m. Gear **TYF**. One specimen.

St. 268. 25. vii. 27. 18° 37′ 00″ S, 10° 46′ 00″ E. 100–150 (–0) m. Gear **TYF**. One specimen.

REMARKS. These specimens, measuring about 9 mm. by 3 mm. including the feet, correspond in detail to Fauvel's description except in the following particulars. There are no simple bristles behind the 2nd chaetiger. The 3rd chaetiger (Fig. 23, *a*) has the aciculum produced into a slender tip extending well beyond the lips of the chaeta sac. Posteriorly to this the aciculum is normal and the bristles (Fig. 23, *b*) are all compound. I can find no trace of a ventral cirrus in the first two chaetigers.

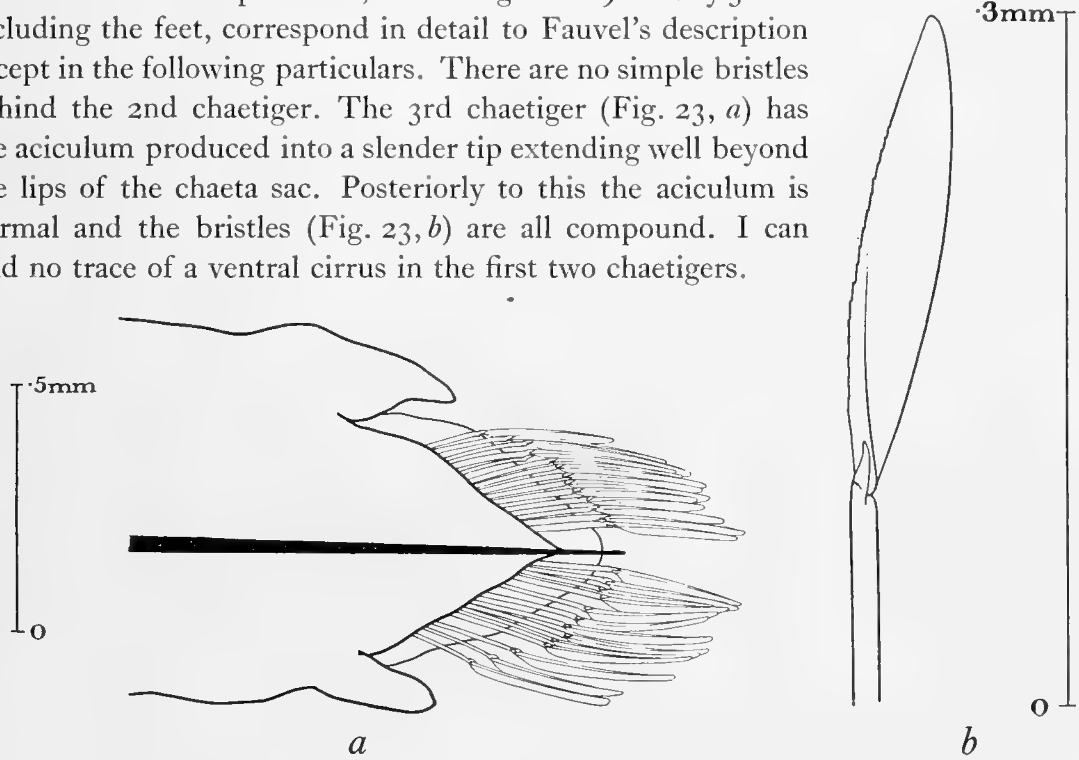


Fig. 23. *Lopadorhynchus krohnii*, var. *simplex*.
a. Third foot. *b*. Compound bristle from third foot.

Family ALCIOPIDAE

REMARKS. Apstein (1900) and Fauvel (1923) have both given admirable accounts, with synonymies, of the majority of the species belonging to this family. When I have nothing to add, I shall do no more than give the references to the descriptions of these authors under the specific names.

Genus Vanadis, Claparède

Vanadis longissima (Levinsen).

Apstein, 1900, p. 11, pl. i, figs. 8–9.
Fauvel, 1923, p. 207, fig. 77 *f*, *g*.

St. 220. 21. iv. 27. Drake Strait. 57° 16′ 00″ S, 67° 06′ 00″ W. 126 m. Gear **N 100 H**. One specimen.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. 800–1000 (–0) m. Gear **TYF**. One specimen.

St. 291. 24. viii. 27. 3° 46′ 00″ N, 16° 49′ 00″ W. 100 (–0) m. Gear **TYF**. One specimen.

Description. The specimen from St. 291 consists of three fragments all presumably belonging to the same animal: joined together they give a length of between 50 mm. and 60 mm. with a breadth of about 3 mm. The anterior border of the prostomium is, with the proboscis everted, slightly concave. There are two very large eyes (Fig. 24, *a* and *b*) with their axes pointing laterally. There is a small conical unpaired tentacle and two pairs of lateral tentacles. There are four pairs of tentacular cirri, the first larger

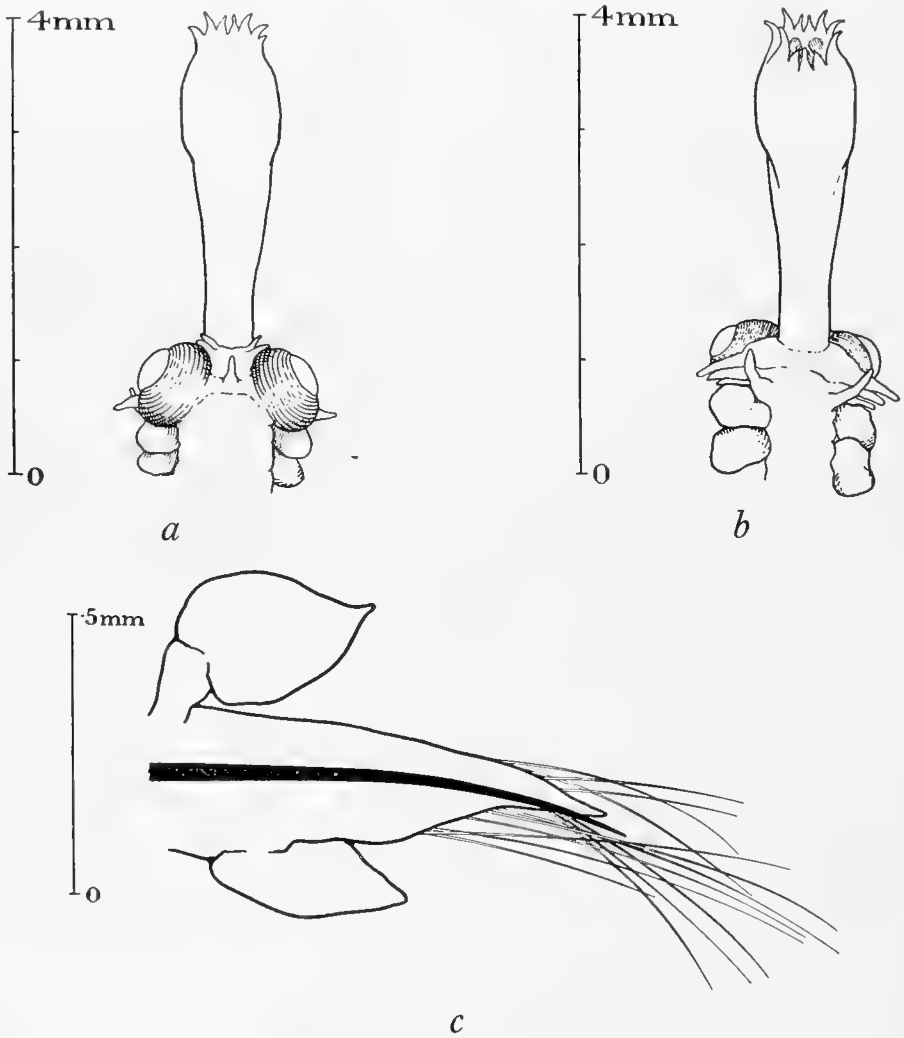


Fig. 24. *Vanadis longissima.*

a. Dorsal view of head. *b.* Ventral view of head. *c.* Middle foot.

than the other three and joined across the ventral surface by a membrane as in *V. formosa*: the fourth pair is very small and rather flattened. The first two pairs of parapodia are modified into sperm vesicles.

The feet (Fig. 24, *c*) are fully developed by about the 7th chaetiger. They consist of a foliaceous dorsal cirrus, a much narrower and more elongated ventral cirrus, and a long conical chaetigerous lobe with a projecting aciculum and a single small cirriform process. The bristles are all of the long compound type.

The distribution of the glands is curious: they occur on every 5th chaetiger up to the 25th and from the 40th to the 60th on every 10th. In the anterior fragment the glands are accompanied by dark brown rings of pigment, running all round the body but fainter in the mid-ventral line. Up to about the 50th chaetiger these rings are two segments deep, but behind the 50th chaetiger they cover one segment only. The glands themselves are very small.

In the posterior fragments they are much larger and occur in groups of 3 or 4 consecutively with one or two glandless segments between each group.

The proboscis is everted and instead of the two long lateral cirriform processes such as occur in *V. formosa*, there are ten small tooth-like papillae, all of about the same size.

The examples from the other two stations consist of a small anterior and a small posterior fragment.

Vanadis formosa, Claparède.

Fauvel, 1923, p. 205, fig. 77 *a–c*.
Apstein, 1900, p. 8, pl. i, figs. 1–6.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. 2000 (–0) m. Gear **N 450**. One specimen.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. 1000 (–0) m. Gear **TYF**. One specimen.

St. 89. 28. vi. 26. 34° 05′ 15″ S, 16° 00′ 45″ E. 1000 (–0) m. Gear **TYF**. One specimen.

St. 102. 28. x. 26. 35° 29′ 20″ S, 18° 33′ 40″ E. 52 m. Gear **N 100 H**. Bottom 1800 m., globigerina ooze. One specimen.

St. 259. 26. vi. 27. 34° 59′ 00″ S, 16° 39′ 00″ E. 170–250 (–0) m. Gear **TYF**. Two specimens.

St. 270. 27. vii. 27. 13° 58′ 30″ S, 11° 43′ 30″ E. 200 (–0) m. Gear **TYF**. One specimen.

St. 282. 12. viii. 27. 1° 11′ 00″ S, 5° 38′ 00″ E. 300 (–0) m. Gear **TYF**. One specimen.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ E. 800–1000 (–0) m. Gear **TYF**. One specimen.

REMARKS. Benham (1921, p. 58) suggests that both McIntosh (1885, p. 175) and Gravier (1911, p. 65) are mistaken in stating that the bristles of the examples described by them as *V. antarctica* are simple and without articulations. A prolonged study of McIntosh's type specimen has convinced me that as far as the latter author is concerned Benham is right. McIntosh's *Alciopa antarctica* has compound bristles. And in view of the great difficulty of observing the chaetal articulations in some specimens, Gravier may also have been mistaken.

V. antarctica is very close to *V. formosa*, but it seems to be a larger and more massive species and lacks the two lateral processes on the proboscis found in *V. formosa*. In *V. antarctica* they are represented by two papillae slightly larger than the rest. *V. antarctica* is not represented in the present collection. Except for one example of *V. longissima* there is no specimen of *Vanadis* from farther south than 34°.

Genus **Torrea**, Quatrefages

Torrea candida (Delle Chiaje).

Asterope candida, Fauvel, 1923, p. 202, figs. 75 *a–d*.

St. 102. 28. x. 26. 35° 29′ 20″ S, 18° 33′ 40″ E. 104 m. Gear **N 100 H**. Bottom 1800 m., globigerina ooze. One specimen.

St. 294. 25. viii. 27. 4° 33′ 15″ N, 16° 52′ 45″ W. 100–150 (–0) m. Gear **TYF**. One specimen.

Remarks. The genus *Asterope*, Claparède, 1870, is both preoccupied by *Asterope*, Philippi, in Crustacea and antedated by *Torrea*, Quatrefages, 1850. In the original description the name *Torrea* is spelled with two r's; Quatrefages himself, in his *Histoire des Annelés* (1865), and subsequent authors write *Torea*.

Genus **Callizona**, Greeff

Callizona angelini (Kinberg).

Fauvel, 1923, p. 215, fig. 81 *d–i*, with synonymy.

St. 250. 17. vi. 27. 36° 09′ 00″ S, 5° 33′ 00″ W. 300 (–0) m. Gear **TYF**. Two specimens.

St. 254. 21. vi. 27. 35° 04′ 00″ S, 2° 59′ 30″ E. 200 (–0) m. Gear **TYF**. One specimen.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. 250 (–0) m. Gear **TYF**. One specimen.

St. 268. 25. vii. 27. 18° 37′ S, 10° 46′ E. 100–150 (–0) m. Gear **TYF**. Two specimens.

Remarks. The tentacular cirri are short and massive: I can find no trace of denticulation on the appendages of the stout bristles. Chamberlin's *Rhynconerella pycnocera* is probably synonymous with this species.

Callizona bongraini, Gravier, from Antarctic waters seems to have, from Gravier's account, long simple capillary swimming bristles, and is therefore perhaps nearer to *Callizonella*, Apstein, *sensu* Fauvel, than to *Callizona* in which the long swimming chaetae are compound.

Genus **Greeffia**, McIntosh

Greeffia oahuensis, McIntosh.

McIntosh, 1885, p. 182, pl. xxviii, figs. 5–7; pl. xxxii, fig. 11; pl. xv A, fig. 4.

St. 273. 31. vii. 27. 9° 38′ 00″ S, 12° 42′ 30″ E. 200–230 (–0) m. Gear **TYF**. One specimen.

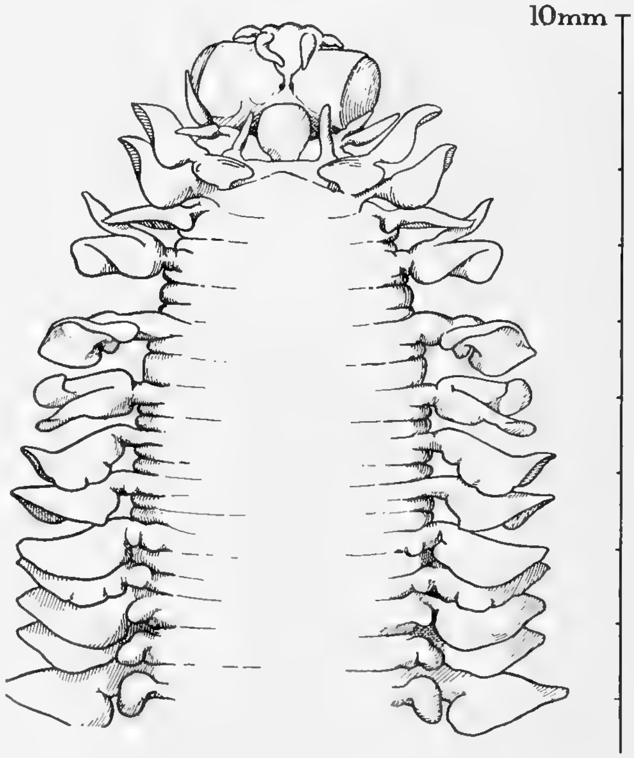


Fig. 25. *Greeffia oahuensis*. Ventral view of anterior end.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. 250 (–0) m. Gear **TYF**. One specimen.

St. 289. 23–24. viii. 27. 3° 04′ 45″ N, 16° 52′ 00″ W. 125–225 (–0) m. Gear **TYF**. One specimen.

Remarks. There are three pairs of tentacular cirri. The ventral pedal glands are in these specimens colourless, and reach their full development about the 12th–15th chaetigers. *Greeffia celox* (Greeff) has four pairs of tentacular cirri. I figure the anterior end seen from below (Fig. 25).

Genus **Rhynconerella**, Costa

Rhynconerella fulgens, Greeff.

Fauvel, 1923, p. 210, fig. 79 *a–d*, with synonymy.

St. SS 33. 20. i. 28. 60° 52′ S, 25° 59′ W. 250–100 m. Gear **N 70 V**. Three specimens.

St. SS 53. 16. ii. 28. 61° 30′ 00″ S, 23° 20′ 00″ W. 250–100 m. Gear **N 70 V**. One specimen.

29° 27′ N, 15° 07′ W. 0–900 m. One specimen.

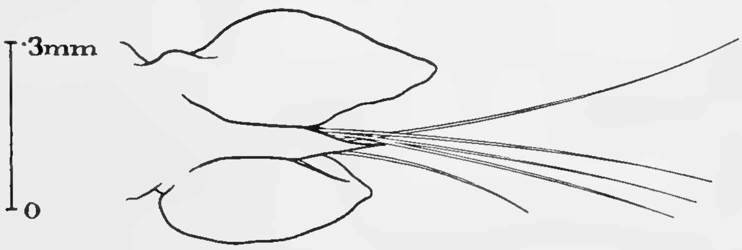


Fig. 26. *Rhynconerella fulgens*. Middle foot.

Remarks. The dorsal cirrus of the 3rd segment is about twice the length of the other tentacular cirri: there is only a single acicular chaeta in the middle feet (Fig. 26). Ehlers records this species from 58° 29′ S, 89° 58′ E.

According to Chamberlin (1919, p. 143) *Rhynconerella gracilis* is the type species of Costa's genus. *R. gracilis* is the same as *Callizona nasuta*, Greeff, the type species of Greeff's *Callizona*, which genus therefore becomes a synonym of *Rhynconerella*. This means that all the species which previous authors grouped under *Callizona* are now to change their generic name to *Rhynconerella*, and Chamberlin has supplied *Plotohelmis* as the generic name for the species that previous authors have grouped under *Rhynconerella*. *Rhynconerella fulgens*, Greeff, is presumably the type species of Chamberlin's *Plotohelmis*. It seems to me that this is an occasion when to adhere to the rule of priority would only lead to confusion, so I retain the generic names *Callizona* and *Rhynconerella* in the sense in which they are used by Apstein, Fauvel and others.

The example from 29° 27′ N, 15° 07′ W is in two pieces, which together measure about 15 mm. in length. The condition precludes a satisfactory examination, but the shape of the body is more elongated and slender than in the Antarctic specimens. They may possibly belong to the longer and more slender *Rhynconerella alata* (Chamberlin). I can, however, discover no distinction in the feet between this specimen and *R. fulgens*.

Genus **Alciopa**, Audouin and M.-Edwards

Alciopa cantrainii (Delle Chiaje).

Apstein, 1900, p. 7, pl. v, fig. 53.
Fauvel, 1923, p. 203, fig. 76 *a–e*.

St. 100. 2. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. 475 (–0) m. Gear **TYF**. One specimen.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. 800–1000 (–0) m. Gear **TYF**. Four specimens.

St. 289. 23–24. viii. 27. 3° 04′ 45″ N, 16° 52′ 00″ W. 125–225 (–0) m. Gear **TYF**. One specimen.

REMARKS. In the specimen from St. 100 the ventral cirri of the first 25 chaetigers are swollen with a white opaque inclusion, which proves to be sperm; and from the 10th to the 25th chaetigers there are just below the feet conspicuous white patches also filled with genital products.

The type specimen of McIntosh's *A. quadrioculata* is useless for purposes of identification or comparison.

Family TOMOPTERIDAE

Genus **Tomopteris**, Eschscholtz

Tomopteris (Tomopteris) carpenteri, Quatrefages.

Benham, 1921, p. 61, pl. viii, figs. 64–66, and 1929, p. 191, pl. ii, figs. 18–23.

St. 17. 4. iii. 26. 46 miles N 46° E of Jason Light, South Georgia. 250–100 m. Gear **N 70 V**. One specimen.

St. 36. 18. iii. 26. 38 miles N 39° E of Jason Light, South Georgia. 0–5 m. Gear **N 100 H**. One specimen. 50 (–0) m. Gear **N 100 H**. One specimen. 90 (–0) m. Gear **N 100 H**. Two specimens.

St. 37. 18–19. iii. 26. 28 miles N 36° E of Jason Light, South Georgia. 90 (–0) m. Gear **N 100 H**. Seventeen specimens.

St. 38. 19. iii. 26. 18·5 miles N 33° E of Jason Light, South Georgia. 0–5 m. Gear **N 100 H**. Two specimens.

St. 41. 28. iii. 26. 16½ miles N 39° E of Barff Point, South Georgia. 0–5 m. Gear **N 100 H**. Three specimens.

St. 114. 12. xi. 26. 52° 25′ 00″ S, 9° 50′ 00″ E. 90 m. Gear **N 100 H**. Five specimens.

St. 118. 19. xi. 26. 53° 07′ 00″ S, 1° 26′ 00″ W. 100 m. Gear **N 100 H**. Three specimens.

St. MS 11. 14. ii. 25. ¼ mile SSW of Hope Point, East Cumberland Bay, South Georgia. 9 m. Gear **NC 50 H**. One specimen.

St. MS 19. 9. iv. 25. 3 miles SW of Merton Rock, East Cumberland Bay, South Georgia. 160 (–0) m. Gear **NC 50 V**. One specimen.

St. MS 22. 9. iv. 25. 1·3 miles N of Dartmouth Point, East Cumberland Bay, South Georgia. 40–0 m. Gear **NC 50 V**. One specimen.

St. MS 25. 13. iv. 25. East Cumberland Bay, South Georgia. 4½ cables NE to 1¼ cables N × W of Hobart Rock. 10 m. Gear **NC 50 H**. One specimen.

St. MS 31. 30. iv. 25. 2 miles N ½ E of Macmahon Rock, East Cumberland Bay, South Georgia. 40–0 m. Gear **NC** 50 **V**. One specimen.

St. MS 32. 1. v. 25. East Cumberland Bay, South Georgia. 4½ cables NE of Hobart Rock to 1½ miles SSE of Hope Point. 0–5 m. Gear **NC** 50 **H**. One specimen.

St. MS 34 A. 2. v. 25. East Cumberland Bay, South Georgia. 3¼ miles SSW of Merton Rock to 4½ cables NE of Hobart Rock. 20 m. Gear **NC** 50 **H**. One specimen.

St. MS 62. 24. ii. 26. East Cumberland Bay, South Georgia. ½ cable E to 3¾ cables S of Hobart Rock. 0–5 m. **N** 70 **H**. Five specimens.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. One specimen.

St. SS 6. 29. xi. 27. 54° 20′ 00″ S, 29° 31′ 00″ W. 137–0 m. Gear **N** 100 **B**. Two specimens.

St. SS 10. 2. xii. 27. 54° 30′ 20″ S, 29° 38′ 43″ W. 100–0 m. Gear **N** 100 **B**. One specimen.

St. SS 12. 6. xii. 27. 54° 30′ 20″ S, 29° 50′ 20″ W. 122–0 m. Gear **N** 100 **B**. One specimen.

St. SS 16. 14. xii. 27. 55° 00′ 00″ S, 27° 29′ 00″ W. 104–0 m. Gear **N** 100 **B**. One specimen.

St. SS 17. 14. xii. 27. 55° 00′ 00″ S, 27° 43′ 00″ W. 99–0 m. Gear **N** 100 **B**. One specimen. Also Net 70 **B**. One specimen.

St. SS 19. 19. xii. 27. 54° 51′ 30″ S, 27° 38′ 00″ W. 137–0 m. Gear **N** 70 **B**. One specimen.

St. SS 21. 21. xii. 27. 56° 12′ 00″ S, 25° 40′ 00″ W. 250–100 m. Gear **N** 70 **V**. Two young specimens.

St. SS 22. 22. xii. 27. 55° 56′ 00″ S, 25° 56′ 00″ W. 95–0 m. Gear **N** 100 **B**. Two specimens. Net 70 **B**. One specimen.

St. SS 32. 18. i. 28. 60° 57′ 00″ S, 25° 57′ 30″ W. 115 (–0) m. Gear **N** 70 **B**. One specimen. Gear **N** 100 **B**. One specimen.

St. SS 57. 23. ii. 28. 61° 49′ 30″ S, 23° 28′ 00″ W. 95–0 m. Gear **N** 70 **B**. One specimen. Gear **N** 100 **B**. One specimen.

REMARKS. Some of these Tomopterids are large and handsome creatures measuring about 65 mm. by 25 mm. including the feet. They correspond in detail with Benham's description of some examples which he attributes to Quatrefages' species: this last is not identifiable with certainty from the scanty description. Eyes are invisible in the larger of my examples and present as a pair of minute black dots in the smaller. There is normally no median notch in the prostomium, but in a few of the smaller examples there appears to be a very slight indentation, which may be an artefact. The hyaline glands are marked by a conspicuous brown patch of colour, and both they and the large ventral chromophil glands can be seen without removing the foot or staining.

I believe that the *T. planktonis* of Apstein from northern waters is identical with this species. The shape of the head and the position of the pedal glands is the same. The only differences that I can discover are size—*T. planktonis* is recorded up to a length of about 10 mm. only—and degree of pigmentation of the hyaline glands: in *T. planktonis* the hyaline glands are described as transparent and little pigmented. If the two species are identical, *T. carpenteri* has priority provided that we accept Benham's interpretation of it. The specimens of *T. carpenteri* described by McIntosh (1885) from the neighbourhood of Kerguelen belong to the same species as those described by Benham.

NOTE. The above remarks were printed before Augener's paper on the plankton of the Weddell Sea reached me. Augener (1929, p. 303 ff.) claims that *T. carpenteri* and *T. planktonis* are distinct species, both with representatives in Antarctic waters, and on p. 306 summarises what he believes to be the distinguishing characters. I cannot here discuss Augener's conclusions, but if he be followed, the examples of *T. planktonis* in the present collection are those from the following stations:—MS 11, 19, 22, 25, 31, 32, 34 A, 62 and SS 21. It is noteworthy that these are all coastal stations.

Tomopteris (Tomopteris) septentrionalis, Quatrefages ex Steenstrup.

Rosa, 1908, p. 297, pl. xii, fig. 17.
Fauvel, 1923, p. 224, fig. 84 *d*.
Benham, 1929, p. 195.
Tomopteris (*Tomopteris*) *eschscholtzi*, Greeff.
Rosa, 1908, p. 306, pl. xii, figs. 21–22.

St. 69. 25. v. 26. 45° 06′ 00″ S, 49° 00′ 00″ W. 45 (–0) m. Gear **N 70 H.** Seven specimens (?). Specimens in bad condition.

St. MS 26 B. 15. iv. 25. East Cumberland Bay, South Georgia. 4½ cables NE to 1¼ cables N × W of Hobart Rock. 10 m. Gear **NC 50 H.** One specimen.

St. SS 6. 29. xi. 27. 54° 20′ 00″ S, 29° 31′ 00″ W. 137 (–0) m. Gear **N 100 B.** Three specimens.

St. SS 10. 2. xii. 27. 54° 30′ 20″ S, 29° 38′ 43″ W. 100 (–5) m. Gear **N 70 B.** Three specimens. Gear 100 **B.** Six specimens.

St. SS 16. 14. xii. 27. 55° 00′ 00″ S, 27° 29′ 00″ W. 104 (–0) m. Gear **N 100 B.** Three specimens. Net 70 **B.** One specimen.

St. SS 17. 14. xii. 27. 55° 00′ 00″ S, 27° 43′ 00″ W. 99 (–0) m. Gear **N 100 B.** Four specimens.

St. SS 19. 19. xii. 27. 54° 51′ 30″ S, 27° 38′ 00″ W. 137 (–0) m. Gear **N 100 B.** Two specimens.

St. SS 20. 19. xii. 27. 54° 52′ 30″ S, 27° 36′ 30″ W. 101 (–0) m. Gear **N 100 B.** Three specimens.

St. SS 21. 21. xii. 27. 56° 12′ 00″ S, 25° 40′ 00″ W. 250–100 m. Gear **N 70 V.** Two specimens. 100–50 m. Two young specimens.

St. SS 24. 24. xii. 27. 56° 49′ 00″ S, 25° 35′ 00″ W. 805 (–0) m. Gear **N 100 B.** Fifteen specimens.

St. SS 32. 18. i. 28. 60° 57′ 00″ S, 25° 57′ 30″ W. 115 (–0) m. Gear **N 70 B.** One specimen. Gear **N 100 B.** One specimen.

St. SS 33. 21. i. 28. 60° 52′ 00″ S, 25° 59′ 00″ W. 250–100 m. Gear **N 70 V.** Two specimens. 50–0 m. One specimen.

St. SS 35. 21. i. 28. 60° 49′ 00″ S, 26° 32′ 00″ W. 119 (–0) m. Gear **N 100 B.** One specimen.

St. SS 44. 3. ii. 28. 62° 23′ 00″ S, 27° 04′ 00″ W. 102 (–0) m. Gear **N 100 B.** One specimen.

St. SS 56. 22. ii. 28. 61° 49′ 00″ S, 23° 54′ 00″ W. 50 (–0) m. Gear **N 50 V.** One specimen.

REMARKS. As Malaquin and Carin (1922, p. 39) have already noted, there is no means of distinguishing between *T. eschscholtzi* and *T. septentrionalis* except the presence in the latter species of very indistinct hyaline glands in the ventral pinna.

In the present collection, among the examples from a single haul, it frequently happens that some can be shown after careful preparation to have indistinct hyaline glands and others cannot. Moreover, in a considerable number the state of fixation is

such that, while it allows the presence of the apical chromophil glands to be seen, it renders impracticable the much more intensive examination necessary for the discovery of the hyaline glands. It therefore seems reasonable to suppose that *T. eschscholtzi* is a *T. septentrionalis* in which the hyaline glands were not or could not be seen. It is also not unlikely that the distinctness of the hyaline glands in *T. septentrionalis* is dependent on their functional activity. The alternative is that I should attribute all the examples that for reasons of preservation, glandular activity, etc., have no apparent hyaline glands to *T. eschscholtzi* and the rest to *T. septentrionalis*, a most unsatisfactory procedure in view of the fact that in occurrence, habitat and structure they are otherwise indistinguishable.

This is a considerably smaller species than *T. carpenteri* together with which it occurs in large numbers around South Sandwich. It is noteworthy that whereas *T. carpenteri* appears to be equally common round South Georgia, from the present collection only a single *T. septentrionalis* was found there. The anterior pair of appendages was not present in any of the specimens.

Tomopteris (Tomopteris) cavallii, Rosa.

Fauvel, 1923, p. 222, fig. 84 *a*.
Benham, 1929, p. 197, pl. ii, figs. 27–28.

St. 89. 28. 6. 26. 34° 05′ 15″ S, 16° 00′ 45″ E. 1000 (–0) m. Gear **TYF**. Four specimens.

REMARKS. In two of these examples, measuring about 12 mm. by 4 mm. including the feet, a pair of small anterior chaetigerous appendages is present: they are feebly developed and probably about to disappear: Fauvel in his diagnosis writes, "1er appendice sétigère manque, même chez les jeunes." There is a pair of large brown eyes at the centre of two ganglionic masses. There are no hyaline glands. The gonads are situated in the dorsal ramus of the foot but in a ripe female some of the ova had penetrated into the ventral ramus also.

Tomopteris (Tomopteris) nisseni, Rosa.

Fauvel, 1923, p. 222, fig. 83 *e*, *g*.

St. 78. 12. vi. 26. 35° 18′ 00″ S, 19° 01′ 10″ W. 1000 (–0) m. Gear **TYF**. Two specimens.
St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. 1000 (–0) m. Gear **TYF**. Two specimens.
St. 89. 28. vi. 26. 34° 05′ 15″ S, 16° 00′ 45″ E. 1000 (–0) m. Gear **TYF**. Three specimens.
St. 267. 23. vii. 27. 24° 31′ 00″ S, 12° 15′ 30″ E. 450–550 (–0) m. Gear **TYF**. One specimen.
St. 282. 12. viii. 27. 1° 11′ 00″ S, 5° 38′ 00″ E. 300 (–0) m. Gear **TYF**. One specimen.
St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. 250 (–0) m. Gear **TYF**. One specimen.
St. 293. 24. viii. 27. 4° 18′ 15″ N, 16° 51′ 00″ W. 100–120 (–0) m. Gear **TYF**. One specimen.

REMARKS. The arrangement of the hyaline glands is very variable in this species (see Malaquin and Carin, 1922, p. 36). In a number of the examples from the various stations the pinnules are frayed out in a curious way, a condition probably due to improper

fixation, and in them the arrangement of the glands cannot be studied, but the occurrence of the ventral glands from the 4th foot and of the dorsal from the 8th–9th, as recorded by Southern, seems to be the more usual. Malaquin and Carin maintain that there is no definite dividing line between the pinnule and the trunk of the foot, and recognise an outer wrinkled part of the pinnule and an inner smooth part. I suggest that the limits of the pinnules are largely, if not entirely, a matter of fixation.

Sub-genus **Johnstonella**, Gosse

Tomopteris (Johnstonella) kempi, n.sp.

St. 4. 30. i. 25. Tristan da Cunha. 36° 55′ 00″ S, 12° 12′ 00″ W. 0–10 m. Gear **N 100 H.** Seven specimens.

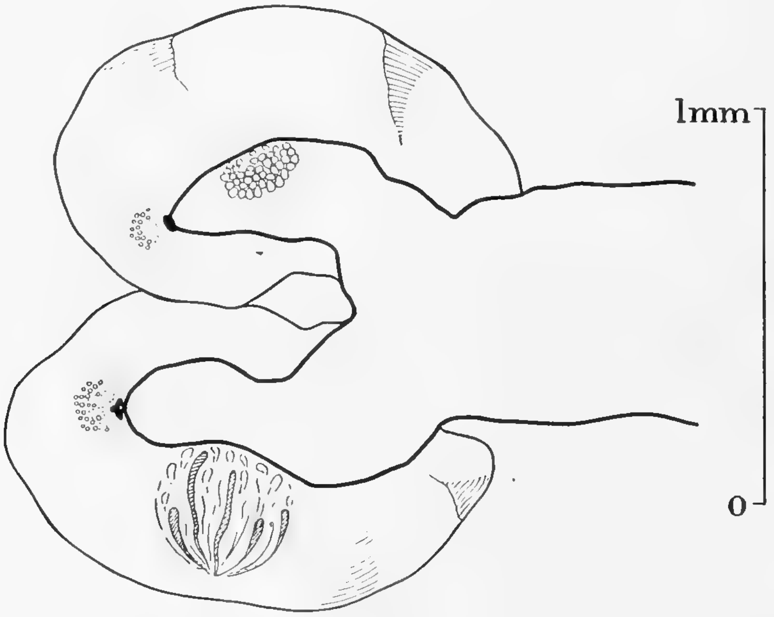


Fig. 27. *Tomopteris kempi.* Middle foot.

Description. The largest of these specimens measures 55 mm. by 20 mm. including the feet (there are 16 pairs of parapodia excluding the tail segments): among them there are two young specimens measuring 12 mm. by 5 mm.

The body has a rather swollen appearance and is very transparent: there is a moniliform tail of seven or eight segments in which the feet are reduced to minute processes near the segmental constrictions. The frontal horns curve backwards and there is a very small notch between them. The neck is fairly stout. The anterior chaetigerous processes are absent and the posterior are in the fully grown specimens about three-quarters the length of the body, and in the young specimens about a third as long again as the body.

The brain is cordiform and the eyes are only visible when the specimen is cleared.

Vibratile pits are present but their exact course cannot be seen because of the distortion of the prostomium in all the examples, caused by the eversion of the proboscis.

The upper end of the latter is produced into a kind of peak and overhangs the lower end.

The feet (Fig. 27) are very large and prominent and the pinnules small in comparison. On the first two feet I can find no trace of a rosette either on the pedal trunks or on the pinnules. On the third and subsequent feet at the point where the trunk of the foot at its apex merges into the pinnule there is a rosette gland on both dorsal and ventral rami. It has the appearance of a small black oculiform spot and beyond it towards the edge of the pinnule is an area filled with brown granules.

I can see no spindle of fine tubules such as is sometimes visible in hyaline glands; moreover, its position in close apposition to the trunk of the foot and the fact that it faces outwards towards the edge of the pinnule, and not inwards towards the foot, strengthen the presumption that it is a true rosette and not a hyaline gland. On the lower part of the pinnule of the ventral ramus is a cupuliform chromophil gland which varies considerably in size in the different specimens. I can find no trace of what Rosa calls an *aculeo*.

All the species of *Johnstonella* with a tail hitherto described have rosettes on the trunks of the first two feet or an *aculeo* or both. These structures are absent from the present species.

Chamberlin has described three species of *Tomopteris*, *T. innatans*, *T. eura* and *T. idiura*; Treadwell has also given an account of two further species, *T. opaca* and *T. tentaculata*. Unfortunately the nature and position of the pedal glands are not specified with sufficient precision for these species to be capable of inclusion within Rosa's system of classification.

NOTE. This species is named after Dr Stanley Kemp, the distinguished leader of the expedition.

Family TYPHLOSCOLECIDAE

Genus **Sagitella**, Wagner

Sagitella kowalewskii, Wagner.

Fauvel, 1923, p. 228, figs. 85 *a–c*.
Benham, 1927, p. 80, pl. ii, figs. 33 and 34.

St. 17. 4. iii. 26. 46 miles N 46° E of Jason Light, South Georgia. 500–250 m. Gear **N 70 V**. One specimen.

St. 78. 12. vi. 26. 35° 18′ 00″ S, 19° 01′ 10″ W. 1000 (–0) m. Gear **TYF**. One specimen.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. 2000 (–0) m. Gear **N 450**. One specimen.

St. 89. 28. vi. 26. 34° 05′ 15″ S, 16° 00′ 45″ E. 1000 (–0) m. Gear **TYF**. Two specimens.

St. 116. 14. xi. 26. 54° 30′ 00″ S, 5° 34′ 00″ E. 110 (–0) m. Gear **N 100 H**. Two specimens.

St. 208. 7. iv. 27. Off Livingston Island, South Shetlands. 62° 49′ 30″ S, 60° 10′ 30″ W. 800 (–0) m. Gear **TYF**. One specimen.

REMARKS. These specimens are conspecific with the example described and clearly figured by Benham from the Ross Sea. I share Benham's doubt whether they should be referred to Wagner's North Atlantic species, and unfortunately I have no example

with which to compare them. Most of them are larger than previously recorded examples, being from 15 mm. to 25 mm. in length. The number of segments is 22 to 25 and is fairly constant.

The collector made the following notes on the colour of the living individuals: St. 78, "colourless transparent"; St. 89, "transparent"; St. 85, "white opaque."

Sagitella cornuta, Ehlers.

Ehlers, 1913, p. 527, pl. xxxix, figs. 8–14.

St. 258. 25. vi. 27. 35° 03′ 30″ S, 13° 55′ 00″ E. 320–450 m. Gear **TYF**. One specimen.

REMARKS. This single specimen has 23 segments and a length of 31 mm. It is easily distinguishable by the paired digitiform processes arising from the nuchal organs behind the head.

Sagitella lobifera, Ehlers.

Ehlers, 1912, p. 24, pl. iii, figs. 1–4.

St. 78. 12. vi. 26. 35° 18′ 00″ S, 19° 01′ 10″ W. 1000 (–0) m. Gear **TYF**. Two specimens.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. 2000 (–0) m. Gear **N 450**. One specimen.

St. 100. 3–4. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. 2500–2000 m. Gear **TYF**. One specimen.

REMARKS. I have compared these specimens with Ehlers' type and am able to modify his account of the nuchal processes on the head. There are only three lobes, a small crescentic lobe in the middle and on either side two longer pinnate lobes with two or three branches on each side of the main stem. Moreover, as Ehlers' figure indicates, the parapodia and the bristles are more prominent and clearly defined than in the other species of the genus. The bristles begin on the 6th foot and not on the 10th–12th as they do in *S. kowalewskii*.

The collector describes the living individuals as "deep scarlet" (St. 100) and "uniformly deep scarlet" (St. 78).

Genus **Typhloscolex**, Busch

Typhloscolex mülleri, Busch.

Fauvel, 1923, p. 226, fig. 85 *f–h*.

St. SS 53. 16. ii. 28. 61° 30′ 00″ S, 23° 20′ 00″ W. 250–100 m. Gear **N 70 V**. One specimen.

REMARKS. A single example which I believe to belong to this species. The cirri are rather large, and it should perhaps be referred to *T. phyllodes*, Reibisch. Both species have been recorded from the Antarctic by Ehlers.

Genus **Travisiopsis**, Levinsen

Travisiopsis sp.

St. 100. 3–4. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. 2500–2000 m. Gear **TYF**. One specimen.

Remarks. The condition of this single example precludes a satisfactory examination. It is a large specimen with 25 feet and measures 37 mm. in length. It seems to be very close to *T. levinseni*, Southern, in the shape of the nuchal processes and in the very wide insertion of the cirri: but the anal cirri are not spatulate. They are wider at the base than at the end and the tips are bluntly rounded: they are supported by a hyaline process. The collector describes the living individual as "semi-transparent orange."

Family HESIONIDAE

Genus **Orseis**, Ehlers

Orseis sp. juv.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NCS** and **NRL**. Twenty specimens.

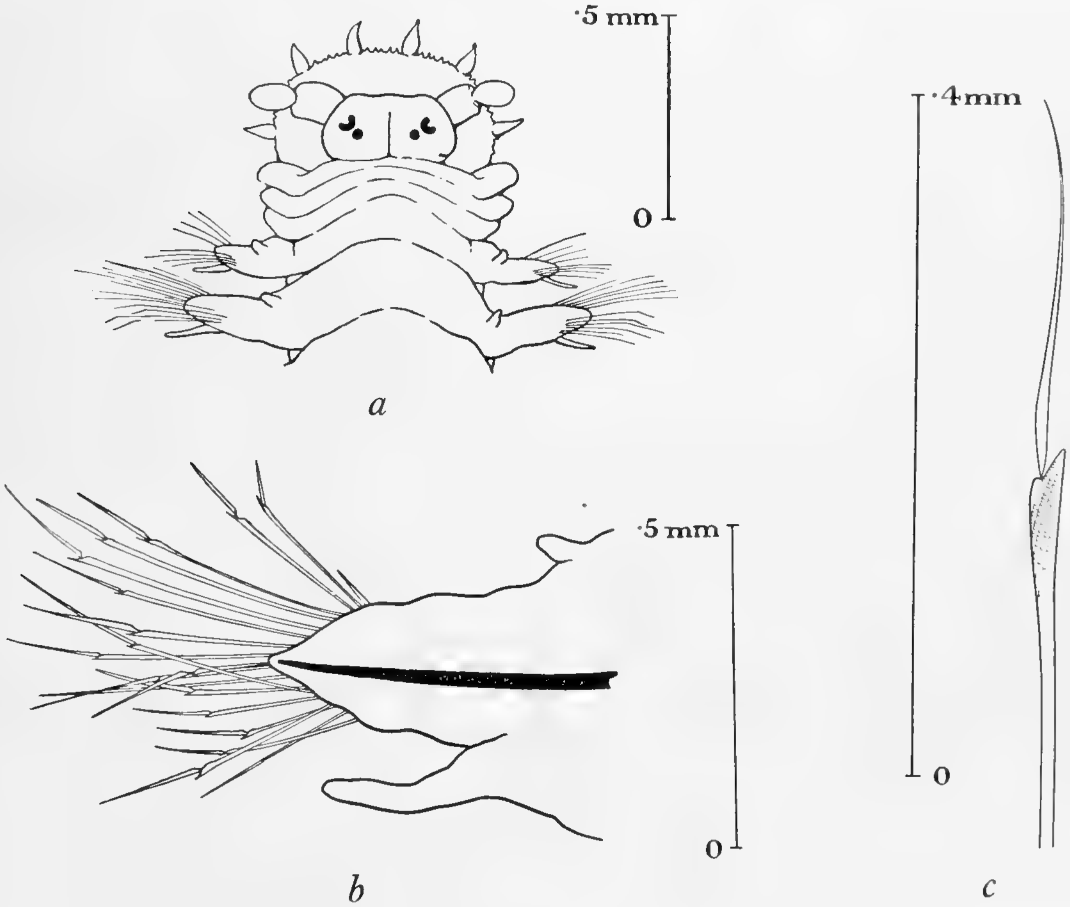


Fig. 28. *Orseis*, sp. Juv.
a. Head and anterior segments. *b*. Foot. *c*. Bristle.

Description. A score of examples of a post-larval Hesionid with about 15 chaetigers. The average size is about 4 mm. by ·5 mm. excluding the feet. There are no colour markings. The prostomium (Fig. 28, *a*) is rectangular, about twice as broad as long,

with two pairs of almost contiguous brown eyes. At the outer ends of the head there is a pair of small biarticulate palps. There are no tentacles, nor tentacular cirri. Behind the head there are two or three achaetous segments and then a foot on each side about half the size of the normal feet. The dorsal cirri are rudimentary, being represented by small projections on the upper side of the foot: the ventral cirri are digitiform and reach to the end of the foot.

The feet (Fig. 28, *b*) are triangular in outline with a central aciculum and a bundle of compound bristles (Fig. 28, *c*) with very long slender blades: the apex of the blades curls over into a hook and there is a second tooth, the point of which is almost in contact with the point of the hook. The pharynx is unarmed and crowned with a circle of about 10 large papillae separated by rows of minute papillae.

REMARKS. I have provisionally assigned these postlarval Hesionids to *Orseis*: they cannot be the *O. mathai*, Gravier, from Port Charcot, because Gravier's specimens measured only $3\frac{1}{2}$ mm. in length and were at a much later stage of development than the present examples, which are slightly larger. The compound chaetae, biarticulate palps and uniramous feet bring this form nearer to *Orseis* than to any other genus.

Genus **Leocrates**, Kinberg

Leocrates diplognathus, Monro.

Monro, 1926, p. 313, text-figs. 1 and 2.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. One specimen.

REMARKS. A single specimen measuring 24 mm. by 3 mm. without the feet. It has the large wing-like folds behind the prostomium, and the double upper jaw-plates described for the examples from the China Sea, but the notopodium begins with the 4th chaetiger instead of the 5th. The *L. greeffianus*, Augener (1918, p. 219), may be identical with this species, but the prostomial wings seem little developed and Augener gives no account of the jaws.

Family SYLLIDAE

Genus **Pionosyllis**, Malmgren

Pionosyllis comosa, Gravier.

Gravier, 1907, p. 15, pl. ii, figs. 12–13.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **OTL**. Bottom: grey mud. One specimen.

REMARKS. A single damaged example corresponding to Gravier's description.

Pionosyllis maxima, n.sp.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Three specimens.

DESCRIPTION. A considerable number of small fragments which probably constituted three individuals. The largest fragment measures 21 mm. by 2 mm. without the feet and is composed of 59 chaetigers. The body is massive and arched dorsally. The colour in spirit is pale yellow with vivid red-brown transverse bands across the back: this banding is more intense in the forepart of the body than behind.

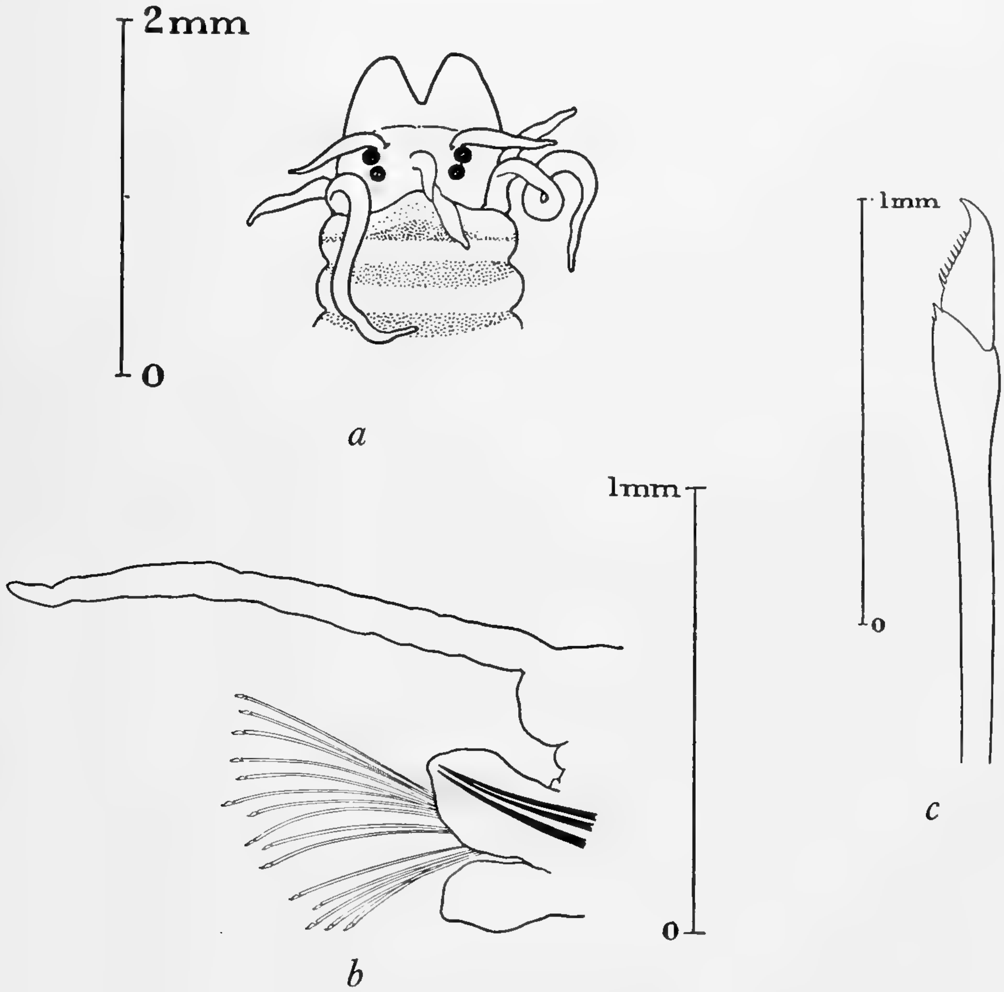


Fig. 29. *Pionosyllis maxima.*
a. Head. *b.* Foot. *c.* Bristle.

The palps are fused at their base and the prostomium (Fig. 29, *a*) is broader than long and rectangular. There are two pairs of almost contiguous eyes, one directly behind the other. The three tentacles are slightly longer than the prostomium: the median is inserted in the middle of the prostomium and the laterals further forward in front of the eyes. The prostomium is deeply notched behind and the notch is hidden by a flap-like prolongation of the buccal segment.

There are two pairs of tentacular cirri, the dorsal almost twice the length of the ventral: the dorsal cirrus of the 1st chaetiger is the longest appendage of the body.

The subsequent dorsal cirri are alternately long and short, the longer being about twice the length of the feet including the bristles. Just below the dorsal cirri swimming bristles are beginning to appear. The chaetal lobe (Fig. 29, *b*) is roughly triangular, the apex of the triangle being formed by the tips of the three acicula above the bristles. The bristles (Fig. 29, *c*) have long slender shafts with simple unidentate hooked blades. The ventral cirri are massive processes comparable, as in Gravier's *Pionosyllis comosa*, with the chaetal lobe.

The pharynx is armed with a single large tooth and as far as I can see has no crown of papillae: it reaches to the 10th chaetiger and the proventriculus to the 24th.

REMARKS. This species is characterised by its large size, its distinctive dorsal colour bands and its unidentate chaetal blades. I know no other *Pionosyllis* that has this combination of characters. It may, however, represent the epitocous phase of the closely allied *P. stylifera*, Ehlers, but the partly sexually modified specimens from Auckland Island attributed to Ehlers' species by Augener (1924, p. 50) have a different colour pattern and a number of bristles with linear end-pieces, absent in my examples.

Genus **Eusyllis**, Malmgren

Eusyllis kerguelensis, McIntosh.

McIntosh, 1885, p. 191, pl. xxix, fig. 4; pl. xxxiii, fig. 3; pl. xv A, fig. 13.
Gravier, 1907, p. 17, pl. ii, figs. 14–16.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 115 m. Gear **DLH**. Bottom: fine sand. Three specimens.

St. 53. 12. v. 26. Port Stanley, East Falkland Island. Hulk of "Great Britain." 0–2 m. Gear **RM**. One specimen.

St. 56. 16. v. 26. Sparrow Cove, Port William, East Falkland Island. 1½ cables N 50° E of Sparrow Point. 10½–16 m. Gear **BTS**. One specimen.

St. 57. 16. v. 26. Port William, East Falkland Island. 5½ cables S 20° W of Sparrow Point. 15 m. Gear **BTS**. One specimen.

St. WS 72. 5. iii. 27. 51° 07′ 00″ S, 57° 34′ 00″ W. 95 m. Gear **OTC**. Bottom: sand and shell. One specimen.

REMARKS. The body is very massive and much arched dorsally as in McIntosh's description. The prostomium (Fig. 30, *a*) is broad and has a median posterior cleft, but the transverse prostomial ridges are not equally visible in all these specimens. The two uppermost bristles (Fig. 30, *b*) in every foot (Fig. 30, *c*) are long and slender and resemble *Ehlersia* bristles. In McIntosh's type the two uppermost bristles are also longer and more slender than the rest, but they do not differ from the rest to the same extent as the homologous bristles in these specimens, which are nearer to those described as *E. kerguelensis* by Willey in his 'Southern Cross' report than they are to McIntosh's

type specimen. It is possible that there are two closely allied species of *Eusyllis* with broad heads, massive dorsally-arched bodies and dorsal parapodial languets, but differing in the character of the prostomium and in the upper bristles.

The specimen from St. 56 has swimming chaetae.

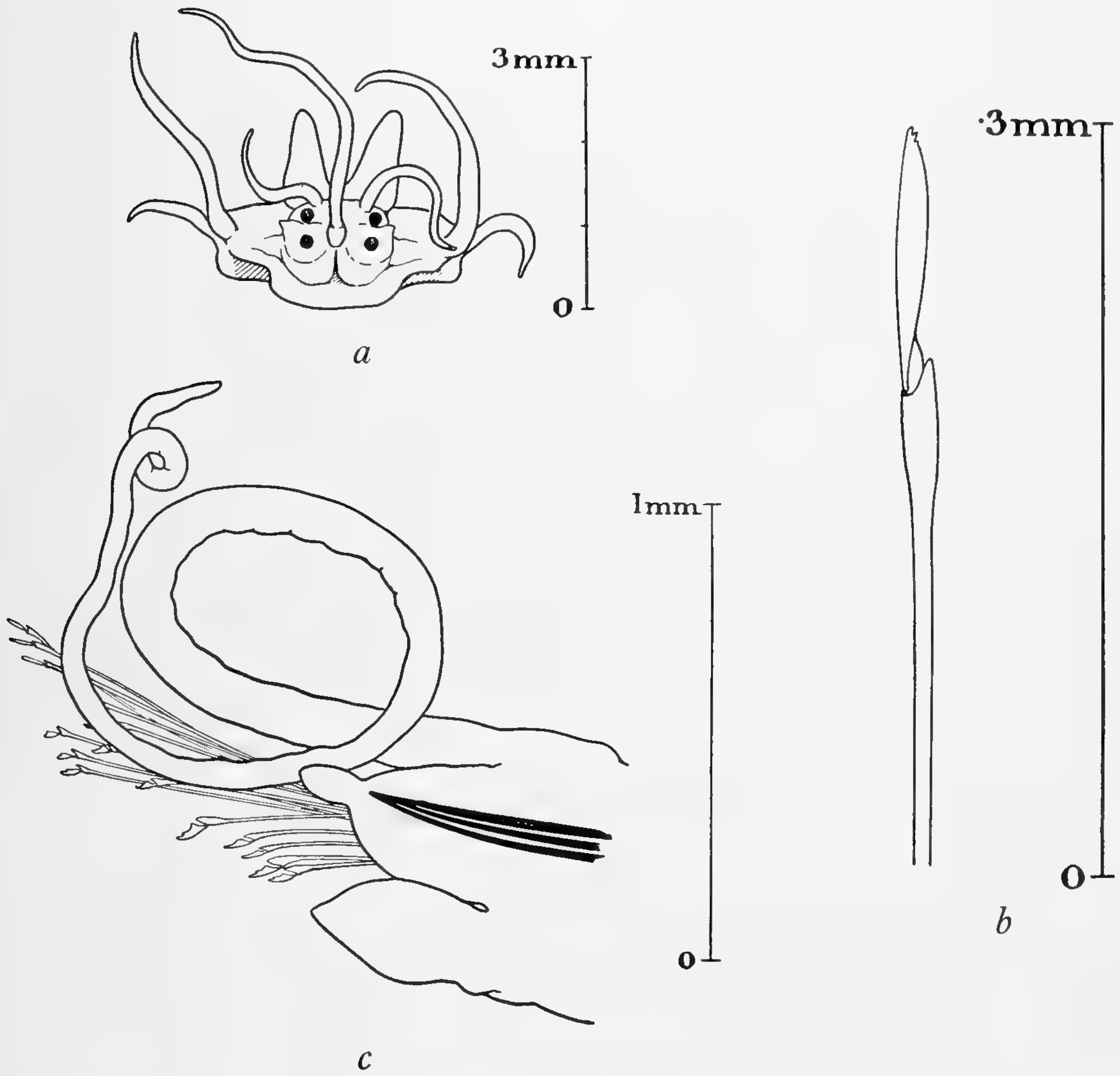


Fig. 30. *Eusyllis kerguelensis.*
a. Head. *b.* Upper bristle. *c.* Foot.

Genus **Trypanosyllis,** Claparède

Trypanosyllis gigantea (McIntosh).

Syllis gigantea, McIntosh, 1885, p. 193, pl. xxx, figs. 1–3; pl. xxxiii, fig. 4; pl. x A, fig. 14; pl. xxiv A, fig. 7.

Trypanosyllis gigantea, Ehlers, 1901, p. 85, pl. vi, figs. 11–16.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. One specimen.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 123. 15. xii. 26. Off mouth of Cumberland Bay, South Georgia. From 4·1 miles N 54° E of Larsen Point to 1·2 miles S 62° W of Merton Rock. 230–250 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. One specimen.

St. 145. 7. i. 27. Stromness Harbour, South Georgia. Between Grass Island and Tonsberg Point. 26–35 m. Gear **BTS**. Two specimens.

St. 148. 9. i. 27. Off Cape Saunders, South Georgia. From 54° 03′ S, 36° 39′ W to 54° 05′ S, 36° 36′ 30″ W. 132–148 m. Gear **OTL**. Bottom: grey mud and stones. One specimen.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N 76½° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. One specimen.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stones and rock. One specimen.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH** and **NRL**. Bottom: stones, mud and rock. "Found inside a colony of *Cephalodiscus nigrescens*, living in the tubules of the polypides." One specimen.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear **BTS**. Bottom: mud and sand. Two specimens.

St. WS 80. 14. iii. 27. 50° 57′ 00″ S, 63° 37′ 30″ W. From 50° 58′ 00″ S, 63° 39′ 00″ W to 50° 55′ 30″ S, 63° 36′ 00″ W. 152–156 m. Gear **OTC**. Bottom: fine dark sand. Two specimens.

St. WS 83. 24. iii. 27. 14 miles S 64° W of George Island, East Falkland Island. From 52° 28′ 00″ S, 60° 06′ 00″ W to 52° 30′ 00″ S, 60° 09′ 30″ W. 137–129 m. Gear **OTC**. Bottom: fine green sand and shell. Two specimens.

St. WS 84. 24. iii. 27. 7½ miles S 9° W of Sea Lion Island, East Falkland Island. From 52° 33′ 00″ S, 59° 08′ 00″ W to 52° 34′ 30″ S, 59° 11′ 00″ W. 75–74 m. Gear **OTC**. Bottom: coarse sand, shell and stones. Two specimens.

St. WS 86. 3. iv. 27. 53° 53′ 30″ S, 60° 34′ 30″ W. From 53° 53′ 00″ S, 60° 37′ 00″ W to 53° 54′ 00″ S, 60° 32′ 00″ W. 151–147 m. Gear **OTC**. Bottom: sand, shell and stones. Three specimens.

St. WS 93. 9. iv. 27. 7 miles S 80° W of Beaver Island, West Falkland Island. From 51° 51′ 00″ S, 61° 30′ 00″ W to 51° 54′ 00″ S, 61° 30′ 00″ W. 133–130 m. Gear **OTC**. Bottom: grey sand. One specimen.

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. From 49° 00′ 00″ S, 62° 00′ 00″ W to 49° 01′ 00″ S, 61° 56′ 00″ W. 146–145 m. Gear **OTC**. Bottom: sand, gravel and stones. Three specimens.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. Two specimens.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. 9¼ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **BTS**. Four specimens.

St. MS ?. 13. iv. 25. East Cumberland Bay, South Georgia. One specimen.

REMARKS. This species has been extensively studied by a number of authors, and I have nothing to add to the numerous accounts of it already given.

Trypanosyllis gemmulifera, Augener.

Augener, 1918, p. 278, pl. v, figs. 99–101, text-fig. 27.

St. 1. 16. xi. 25. Clarence Bay, Ascension Island. 7° 55′ 15″ S, 14° 25′00″ W. 16–27 m. Gear **NRM**. Bottom: coralline sand and shell. One specimen.

REMARKS. The single example of this species from Ascension Island corresponds in detail to Augener's description. The long cirri, the bidentate chaetal blades, and the brown double banding on the back are distinctive. I can find no trace of buds.

Genus **Autolytus**, Grube

Autolytus charcoti, Gravier.

Gravier, 1907, p. 7, pl. i, figs. 1–2.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH** and **NRL**. Bottom: stones, mud and rock. "Found inside a colony of *Cephalodiscus nigrescens*, living in the tubules of the polypides." One specimen.

St. MS 14. 17. ii. 25. From 1·5 miles SE × S to 1·5 miles S ½ W of Sappho Point, East Cumberland Bay, South Georgia. 190–110 m. Gear **DS**. One specimen.

REMARKS. This species is characterised by the very distinct nuchal organs and the long slender tentacular and dorsal cirri.

In the specimen from St. 190, the pedal lobe is more thickened on top above the bristles than as shown by Gravier, but less than in McIntosh's *A. maclearanus*.

Autolytus gibber, Ehlers.

Ehlers, 1897, p. 55, pl. iii, figs. 71 and 72.

St. 141. 29. xii. 26. East Cumberland Bay, South Georgia. 200 yards from shore under Mount Duse. 17–27 m. Gear **BTS**. Bottom: mud. Three specimens.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island, 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH**. Bottom: rock. One specimen.

REMARKS. The examples of this species are all in rather poor condition. *A. gibber* is a more massive species than *A. charcoti*, the tentacles and tentacular cirri are thicker and shorter and the nuchal organs very much less distinct. I cannot distinguish with certainty the flap or gibbosity behind the head described by Ehlers. In the example from St. 170, the transverse lines of pigment dots are faintly visible across the back, but not on the cirri.

Autolytus simplex, Ehlers.

Ehlers, 1901, p. 97, pl. x, figs. 5–8.
Pratt, 1901, p. 2.
Fauvel, 1916, p. 430.

St. 53. 12. v. 26. Port Stanley, East Falkland Island. Hulk of "Great Britain." 0–2 m. Gear **RM**. Twelve specimens.

St. 57. 16. v. 26. Port William, East Falkland Island. $5\frac{1}{2}$ cables S 20° W of Sparrow Point. 15 m. Gear **BTS**. Four specimens.

St. 63. 22. v. 26. 48° 50′ 00″ S, 53° 56′ 00″ W. 0 m. Gear **NH**. "From floating *Macrocystis*." Four specimens.

REMARKS. The four specimens from St. 63 measure 10–14 mm. by 1 mm. including the feet and are in the "Chain" phase.

The head and its appendages are well figured by Ehlers, the 1st dorsal cirrus being longer than the tentacular cirri. The dorsal cirri are very short and rather thick and the second tooth of the chaetal blades is longer than the first. The pharynx runs straight from the 1st to 3rd chaetigers: in the 3rd it loops backwards alongside the proventriculus into the 4th chaetiger: the proventriculus extends from the 3rd to the 6th chaetigers. At the 14th chaetiger the stolon begins and is marked by a head in different stages of development in the various examples. In the most highly developed there are two pairs of brown eyes, a pair of forked palps, a median and two lateral tentacles. Behind the head in the largest stolon there are about 45 chaetigers. The stolon seems to show no differences from the stock except that the constrictions between the segments are more marked. In the less developed specimens the head of the stolon appears as a white pad of tissue across the 14th chaetiger. There are no traces either of swimming bristles or of *Ehlersia* bristles. There is never more than one individual behind the stock.

Autolytus (Sacconereis) sp.

St. 135. 21. xii. 26. 54° 22′ 00″ S, 35° 39′ 00″ W. 64 m. Gear **N 70 H**. One specimen.

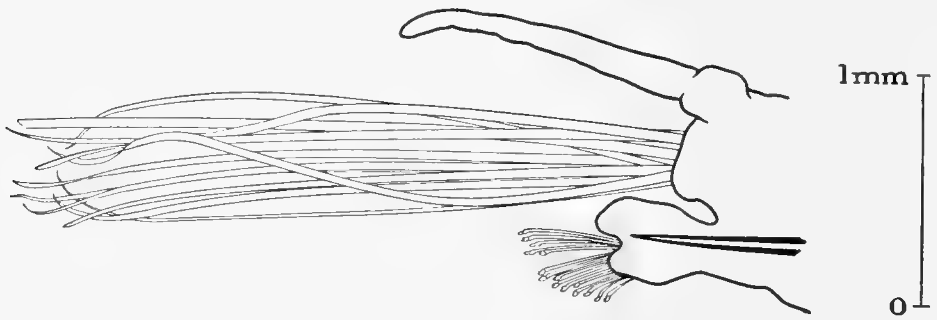


Fig. 31. *Autolytus*, sp. Middle foot.

DESCRIPTION. A single example tightly curled round a cluster of eggs. The eggs are very numerous and small, and the brood pouch is not visible, but the firm line of the outer edge of the egg-cluster has the appearance of having been made by some external container. All that can be seen, however, is the large mass of eggs adhering together and apparently held in place by the twisting of the mother's body around them. I cannot make a thorough examination without uncoiling the specimen and so dislodging the eggs, so I have to leave a number of characters unexamined. The colour is a pale brown and all the markings are faded from the body. The tentacles and cirri are indistinctly moniliform.

The prostomium is broader than long, rectangular and with two pairs of large black eyes. The median tentacle is very long, about five times as long as the prostomium, and arises at the back of the head. The lateral tentacles are about half the length of the median and arise at the sides of the prostomium between the front and hinder pairs of eyes. There are two pairs of tentacular cirri which come off below the head. The dorsal are about the length of the lateral tentacles and twice as long as the ventral. The segment to which they are attached is incomplete dorsally. The first dorsal cirrus is very long, of about the length of the median tentacle, and the following dorsal cirri are about half its length, and the first three or four feet are very small and crowded together. There are no ventral cirri. About the first ten chaetigers and the last forty are without the long swimming bristles: owing to the coiling of the specimen I cannot make an exact count.

There is a long dorsal cirrus below which in all the middle chaetigers (Fig. 31) is a tuft of long transparent swimming chaetae: below these again is the lobe of the foot, oval in outline and with a notch or incision at its apex just below the ends of the acicula. The compound bristles are numerous, with a short bidentate blade showing a typical *Autolytus* structure. For the reasons already given I cannot examine the pharynx or make a measurement of the body length.

Remarks. I have assumed that the broad pouch in this specimen has burst and disintegrated, for the absence of palps and of ventral cirri, the structure of the chaetal blades and the shape of the dorsal cirri all go to show that this example is a *Sacconereis*. It may be the female sexual form of *Autolytus maclearanus* of which Ehlers (1913, p. 492, Pl. xxxiv, fig. 3) gives a very brief account and a rather sketchy figure.

Genus **Grubea**, Quatrefages

Grubea clavata (Claparède).

Augener, 1918, p. 295.
Fauvel, 1923, p. 296, fig. 114 *a–e*.
? *Grubea rhopalophora*, Ehlers.
Ehlers, 1897, p. 53, pl. iii, figs. 66–70.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear BTS. Bottom: mud and sand. Four specimens.

Remarks. With some hesitation I refer these minute worms to Claparède's North Atlantic species rather than to the Antarctic *G. rhopalophora*, because the upper of the tentacular cirri is decidedly longer than the lower. The dorsal cirri are of the gradually tapering fusiform kind, and there is a marked constriction in the pharynx a short distance above the proventriculus. The second tooth on the bristles is exceedingly small and can only be seen at a very high magnification. As Ehlers has noted, there is a considerable variation in the shape of the dorsal cirri in *G. rhopalophora*. If this extends to the relative lengths of the dorsal and ventral tentacular cirri, the distinction between *G. rhopalophora* and *G. clavata* ceases to exist.

Genus Syllis, Savigny

Syllis prolixa, Ehlers.

Ehlers, 1901, p. 92, pl. ix, figs. 1–7.
Syllis longifilis, Ehlers, 1901, p. 95, pl. x, fig. 3.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. One specimen.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. One specimen.

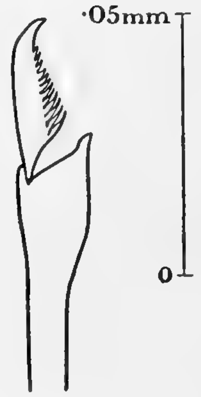


Fig. 32. *Syllis prolixa*. Bristle.

REMARKS. I have assigned these two specimens to *S. prolixa*, because of their long multi-articulate dorsal cirri and the absence of a second tooth to the chaetal blades. About the latter character it is very difficult to be certain with the material at my disposal, but I am unable definitely to find a subapical tooth. In the example from St. 58, traces of a transverse brown banding can be discerned. The bristles (Fig. 32) closely resemble that figured by Ehlers for *S. longifilis*. *S. prolixa* and *S. longifilis* seem to be growth stages of the same species, and the former has priority.

Syllis brachychaeta, Schmarda.

Augener, 1918, p. 247, pl. iv, figs. 83–85; pl. v, fig. 98, text-fig. 20; and 1924 A, p. 358.

St. 4. 30. i. 26. Tristan da Cunha. 36° 55′ 00″ S, 12° 12′ 00″ W. 40–46 m. Gear **DL**. Bottom: stones. "From débris of stones with incrustations." Four specimens.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH** and **NRL**. Bottom: stones, mud and rock. "Found inside a colony of *Cephalodiscus nigrescens*, living in the tubules of the polypides." Eight specimens.

Saldanha Bay beach, Cape of Good Hope. One specimen.

REMARKS. Augener has studied this species at great length, and has come to the conclusion that *Syllis closterobranchia*, Schmarda, and *S. hyalina*, Grube, are synonyms of *S. brachychaeta*. I have not sufficient material to form an opinion of my own on this matter, so I accept Augener's conclusions.

This species is easily recognisable by its short pauci-articulate spindle-shaped dorsal cirri.

Syllis brachycola, Ehlers.

Ehlers, 1897, p. 38, pl. ii, figs. 46 and 47.
Augener, 1924, p. 362.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **NCS–T**. Bottom: fine sand. One specimen. Also at 115 m. Gear **DLH**. Two specimens.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 50′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH** and **NRL**. Bottom: stones, mud and rock. "Found inside colony of *Cephalodiscus nigrescens*, living in the tubules of the polypides." One specimen.

St. WS 128. 10. vi. 27. West side of Gough Island, inshore. 40° 19′ 00″ S, 10° 04′ 00″ W. 120–90 m. Gear **DLH**. Six specimens.

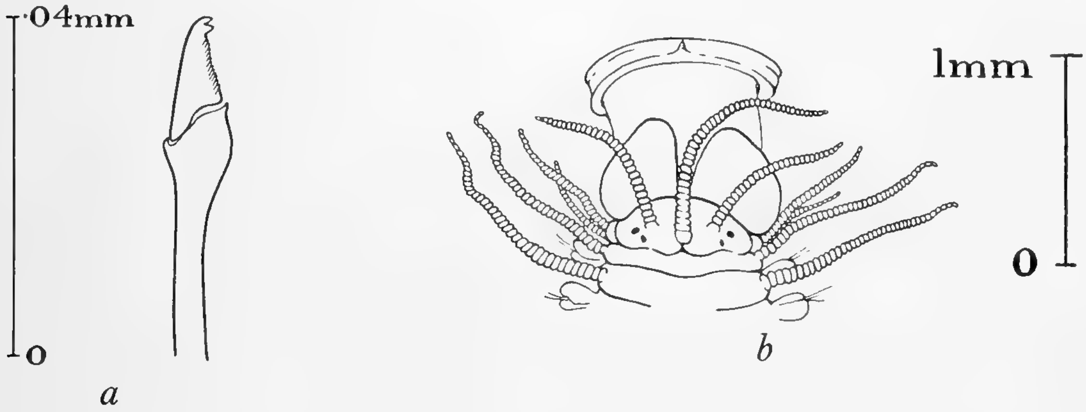


Fig. 33. *Syllis brachycola.*

a. Bristle. *b.* Head with pharynx everted (the papillae are omitted from the proboscis sheath).

Remarks. I have much hesitation in assigning these specimens to Ehlers' species because the head of the chaetal shafts is more expanded, and the blades (Fig. 33, *a*) much shorter and stouter than those figured by Ehlers (*loc. cit.*) and by Gravier (1907, p. 20, text-fig. 14). I find two kinds of southern *Syllis* with long multi-articulate dorsal cirri and bidentate chaetal blades in this collection. One in which the bristles are few (seven to eight), and the chaetal blades are short and broad with a very distinct second tooth; the other has more numerous bristles and longer and more slender chaetal blades with a slight second tooth. In both, the pharynx is rather long, reaching to the 13th–15th chaetigers and the proventriculus to the 20th–21st, and the tooth is terminal.

The forms with the broad chaetal blades I have doubtfully assigned to *S. brachycola*, and those with slender chaetal blades to *S. variegata*. In two or three of the examples of *S. brachycola* the front part of the body is coloured brown, the pigment extending to the dorsal cirri. One of the longer dorsal cirri from the middle of the body has about 45–50 articulations. I figure a head with the pharynx everted (Fig. 33, *b*).

Except in the shape of the chaetal blades, these specimens agree with Ehlers' description.

Syllis variegata, Grube.

Augener, 1918, p. 234.
Fauvel, 1923, p. 262, fig. 97 *h–n*.

St. 2. 17. xi. 25. Clarence Bay, Ascension Island, Catherine's Point and Collyer Point. Shore collection. From buoy. Four specimens.

St. 52. 5. v. 26. Port William, East Falkland Island. 7·4 cables N 17° E of Navy Point. 17 m. Gear **LH**. Seven specimens.

St. 55. 16. v. 26. Entrance to Port Stanley, East Falkland Island. 2 cables S 24° E of Navy Point. 10–16 m. Gear BTS. Three specimens.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear RM. Two specimens.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 77 m. Gear DLH. One specimen.

St. WS 88. 6. iv. 27. 54° 00′ 00″ S, 64° 57′ 30″ W. From 54° 00′ 00″, 65° 00′ 00″ W to 54° 00′ 00″ S, 64° 55′ 00″ W. 118 m. Gear OTC. Bottom: sand, shell and stones. One specimen.

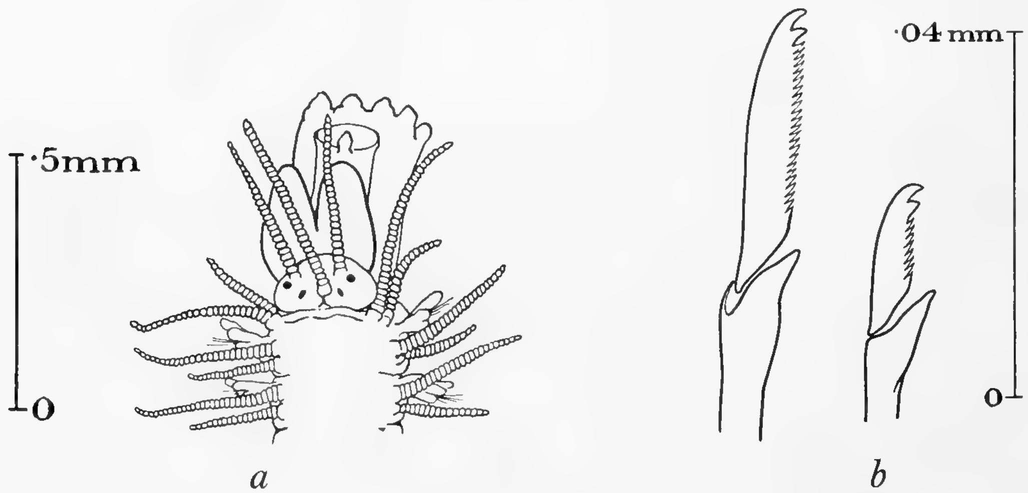


Fig. 34. *Syllis variegata.*
a. Head. *b.* Bristles.

Remarks. I have compared these examples with a specimen of this species from European waters and I can discover no ground for separation. I figure a head (Fig. 34, *a*) and two bristles (Fig. 34, *b*).

Syllis sclerolaema, Ehlers.

Ehlers, 1901, p. 86, pl. x, figs. 1–2.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear OTL. Bottom: fine sand. Two specimens.

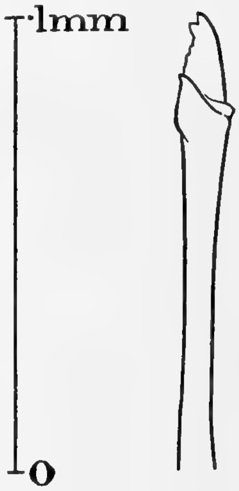


Fig. 35. *Syllis sclerolaema.* Bristle.

Remarks. Two rather damaged fragments which I believe to belong to this species. The body is rather massive and dorsally arched. The prostomium is very small and the palps are very broad at the base. I can see two pairs only of minute eyes, the anterior larger than the hinder. The chaetal lobe has two unequal lips. The bristles (Fig. 35) are broad at the head of the shaft and the articulation between blade and shaft can only be seen after careful examination. The blade has the appearance of an uninterrupted continuation of the shaft (pseudoypsiloid) as shown in Ehlers' figure and it ends in a bidentate hook. The ventral cirrus is large and triangular in outline.

Family NEREIDAE

Genus **Nereis**, Cuvier

Nereis kerguelensis, McIntosh.

McIntosh, 1885, p. 225, pl. 35, figs. 10–12; pl. xvi A, figs. 17 and 18.
Ehlers, 1897, p. 65, pl. iv, figs. 81–93.
Fauvel, 1923, p. 342, fig. 133 *g–m*.
Nereis larseni, Monro, 1926, p. 320, text-figs. 9–11. For the rest of the synonymy see Fauvel, 1917, p. 433.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Seven specimens.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. "Off kelp root." Bottom: fine sand. One specimen.

St. 141. 29. xii. 26. East Cumberland Bay, South Georgia. 200 yards from shore under Mount Duse. 17–27 m. Gear **BTS**. Bottom: mud. Six specimens.

St. 145. 7. i. 27. Stromness Harbour, South Georgia. Between Grass Island and Tonsberg Point. 26–35 m. Gear **BTS**. Four specimens.

St. 163. 17. ii. 27. Paul Harbour, Signy Island, South Orkneys. 18–27 m. Gear **BTS**. One specimen.

St. 164. 18. ii. 27. East end of Normanna Strait, South Orkneys, near Cape Hansen, Coronation Island. 24–36 m. Gear **BTS**. Four specimens.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. Two specimens.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH** and **NRL**. Bottom: stones, mud and rock. Two specimens.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear **BTS**. Bottom: mud and sand. Three specimens.

St. WS 56. 14. i. 27. Larsen Harbour, Drygalski Fiord, South Georgia. 2 m. Gear **NH**. From kelp root. Seven specimens.

St. WS 65. 22. i. 27. Undine Harbour (North), South Georgia. Shore collection: from kelp root. Ten specimens.

St. WS 71. 23. ii. 27. 6 miles N 60° E of Cape Pembroke Light, East Falkland Island. 51° 38′ 00″ S, 57° 32′ 30″ W. 82–80 m. Gear **OTC**. Bottom: sand. One specimen.

St. WS 84. 24. iii. 27. $7\frac{1}{2}$ miles S 9° W of Sea Lion Island, East Falkland Island. From 52° 33′ 00″ S, 59° 08′ 00″ W to 52° 34′ 30″ S, 59° 11′ 00″ W. 75 m. Gear **OTC**. Bottom: coarse sand, shell and stones. One specimen.

St. WS 86. 3. iv. 27. 53° 53′ 30″ S, 60° 34′ 30″ W. From 53° 53′ 00″ S, 60° 37′ 00″ W to 53° 54′ 00″ S, 60° 32′ 00″ W. 151–147 m. Gear **OTC**. Bottom: sand, shell and stones. "Found in association with an Alcyonarian." One specimen.

St. MS 6. 12. ii. 25. East Cumberland Bay, South Georgia. $\frac{1}{4}$ mile S of Hope Point to $1\frac{1}{4}$ cables S × E of King Edward Point Light. 24–30 m. Gear **BTS**. Four specimens.

St. MS 68. 2. iii. 26. East Cumberland Bay. 1·7 miles S $\frac{1}{2}$ E to $8\frac{1}{2}$ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. Two specimens.

REMARKS. I can confirm Ramsay's (1914, p. 42) observation that the southern examples of this species have no heterogomph spinigers. I have examined the type of *Nereis patagonica*, McIntosh (1865, p. 228): the proboscis is withdrawn and previous dissection has made it impossible to study the arrangement of the paragnaths with any accuracy, but its general facies and its feet are those of a typical *N. kerguelensis*.

Nereis callaona, Grube.

Augener, 1918, p. 184, with synonymy.

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa. Basin of H.M. Dockyard. 0–2 m. Gear **NH**. One specimen.

REMARKS. The specimen from St. 90 is a small anterior fragment of 25 chaetigers, and measures 11 mm. by 2 mm. including the feet. It is doubtfully of this species. The proboscis is withdrawn, but as far as I can see, the arrangement of the paragnaths corresponds to that in Kinberg's figures of the proboscis (as *N. angusta*), with the exception that there is clearly a single paragnath in Group V.

The feet are indistinguishable from those described for this species.

Nereis eugeniae (Kinberg).

Char. emend. Ehlers, 1897, p. 67, pl. iv, figs. 94–105.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. "Off kelp root." Bottom: fine sand. Sixteen specimens.

St. 52. 5. v. 26. Port William, East Falkland Island. 7·4 cables N 17° E of Navy Point. 17 m. Gear **LH**. One specimen.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. One specimen.

St. WS 71. 23. ii. 27. 6 miles N 60° E of Cape Pembroke Light, East Falkland Island. 51° 38′ 00″ S, 57° 32′ 30″ W. 80–82 m. Gear **OTC**. Bottom: sand. One specimen.

St. WS 79. 13. iii. 27. 51° 01′ 30″ S, 64° 59′ 30″ W. From 51° 00′ 00″ S, 65° 00′ 00″ W to 51° 03′ 00″ S, 64° 59′ 00″ W. 132–131 m. Gear **OTC**. Bottom: fine dark sand. Four specimens.

St. WS 80. 14. iii. 27. 50° 57′ 00″ S, 63° 37′ 30″ W. From 50° 58′ 00″ S, 63° 39′ 00″ W to 50° 55′ 30″ S, 63° 36′ 00″ W. 152–156 m. Gear **OTC**. Bottom: fine dark sand. Four specimens.

St. WS 81. 19. iii. 27. 8 miles N 11° W of North Island, West Falkland Island. From 51° 30′ 00″ S, 61° 15′ 00″ W to 51° 30′ 30″ S, 61° 10′ 00″ W. 81–82 m. Gear **OTC**. Bottom: sand. One specimen.

St. WS 84. 24. iii. 27. 7½ miles S 9° W of Sea Lion Island, East Falkland Island. From 52° 33′ 00″ S, 59° 08′ 00″ W to 52° 34′ 30″ S, 59° 11′ 00″ W. 75 m. Gear **OTC**. Bottom: coarse sand, shell and stones. One specimen.

REMARKS. This species appears to be common off the Falkland Islands. It was first recorded from there by Ramsay (1914, p. 43). It is considerably larger and slightly darker in colour (in spirit) than the other two common southern nereids *N. kerguelensis* and *N. magalhaensis*. It seems not to penetrate further south than the Falkland Islands.

Ehlers figures the paragnaths of Groups VII and VIII as vaguely distichous. They form a single very sparse rather irregular row and in a number of the larger examples they appear to be altogether absent.

Nereis typhla, n.sp.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH**. Bottom: rock. One specimen.

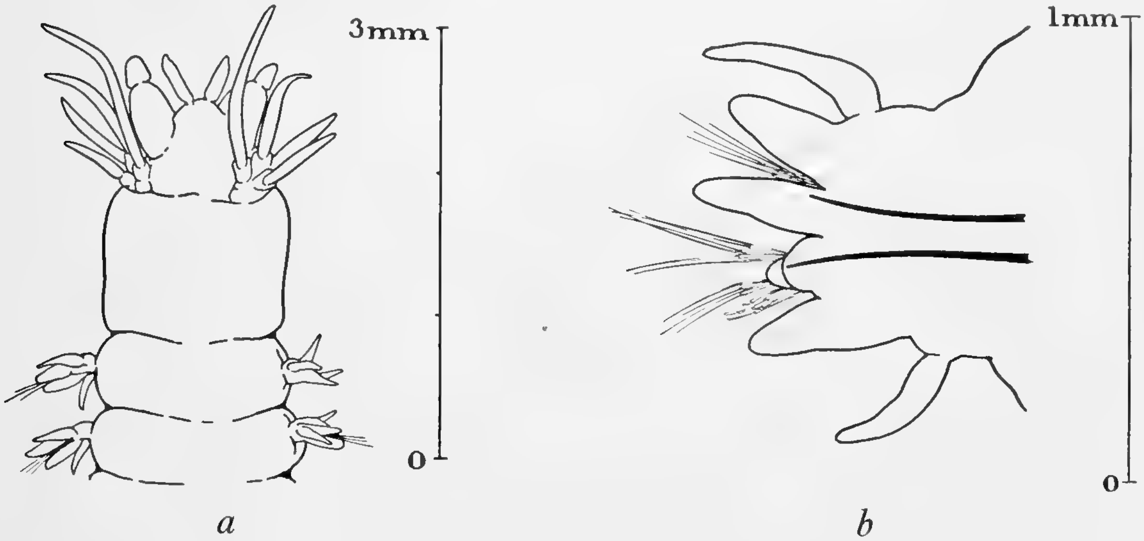


Fig. 36. *Nereis typhla*.
a. Head. *b*. Foot.

Description. A single fragment measuring 26 mm. by 3 mm. including the feet and with 58 chaetigers. The colour in spirit is a pale brown with a dark stripe down the middle of the back, broader and more indistinct in front, narrower and more clearly defined in the rest of the body. The prostomium (Fig. 36, *a*) is longer than broad and the tentacles are about half its length. There are no eyes or ocular pigment of any kind, even beneath the skin. The palps end in a conical terminal article. The tentacular cirri are short, the longest reaching to the posterior border of the first chaetiger. The buccal is twice the length of the following segment. The proboscis is withdrawn and the exact arrangement of the paragnaths is difficult to discern. Of the oral ring Group VI alone is represented by a small collocation of about five minute paragnaths. Of the maxillary ring Group II is represented by a mass of about eight rather larger paragnaths, and IV by an oblique distichous row of paragnaths of about the same size as those in Group II. I am uncertain whether Group III is present. The jaws are of the usual form with three teeth below the main fang.

The feet (Fig. 36, *b*) are very like those of *N. eugeniae*. The notopodium has two pointed languets of about equal length, from between which the dorsal bristles emerge. The lips of the neuropodial chaeta sac are unequal but with only a slight difference in size: the ventral languet is of the same shape as the dorsal but a little smaller. The dorsal cirrus is very slightly longer than the upper dorsal languet, and the ventral cirrus is small, set far back and reaches about half-way down the ventral languet. The dorsal bristle bundle contains homogomph spinigers, the upper ventral bundle homogomph spinigers and heterogomph falcigers, the lower ventral bundle heterogomph spinigers and heterogomph falcigers.

Remarks. I had much hesitation in basing a new species on a single example, but the complete absence of eyes together with the arrangement of the paragnaths is distinctive. This species is closely related to *N. eugeniae*: as I have already remarked about that species, there is a tendency for the paragnaths of Groups VII and VIII to disappear. When these are absent, the arrangement is similar to that in *N. typhla*. Moreover, the eyes in *N. eugeniae* are not so distinct as in most species of *Nereis*, and I can confirm Ehlers' observation: "Die Augen auf den Seitentheilen der hinteren Hälfte des Kopflappens schimmern in der atoken Form oft wenig deutlich durch die Haut durch." I regard *N. typhla* as a *N. eugeniae* that has lost its eyes and the paragnaths of Groups VII and VIII.

Nereis pelagica, L.

Fauvel, 1923, p. 336, fig. 130 *a–f*.

St. 4. 30. i. 26. Tristan da Cunha. 36° 55′ 00″ S, 12° 12′ 00″ W. 40–46 m. Gear **DL**. Bottom: stones. Three young specimens.

Platynereis magalhaensis, Kinberg.

Fauvel, 1917, pl. viii, figs. 21 and 22, with synonymy.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. "Off kelp root." Bottom: fine sand. Three specimens.

St. 53. 12. v. 26. Port Stanley, East Falkland Island. Hulk of "Great Britain." 0–2 m. Gear **RM**. Twenty specimens.

St. 55. 16. v. 26. Entrance to Port Stanley, East Falkland Island. 2 cables S 24° E of Navy Point. 10–16 m. Gear **BTS**. Two specimens.

St. 56. 16. v. 26. Sparrow Cove, Port William, East Falkland Island. $1\frac{1}{2}$ cables N 50° E of Sparrow Point. $10\frac{1}{2}$–16 m. Gear **BTS**. "From carapace of *Paralomis*." Four specimens. Also two further specimens not so labelled.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. Two specimens.

St. 145. 7. i. 27. Stromness Harbour, South Georgia. Between Grass Island and Tonsberg Point. 26–35 m. Gear **BTS**. One specimen.

St. 222. 23. iv. 27. St Martin's Cove, Hermite Island, Cape Horn. 30–35 m. Gear **NRL**. Three specimens.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear **BTS**. Bottom: mud and sand. Two specimens.

St. WS 65. 22. i. 27. Undine Harbour (North), South Georgia. Shore collection: "from kelp root." One specimen.

St. WS 75. 10. iii. 27. 51° 01′ 30″ S, 60° 31′ 00″ W. From 51° 00′ 00″ S, 60° 30′ 00″ W to 51° 02′ 42″ S, 60° 31′ 42″ W. 64–104 m. Gear **OTC**. One specimen.

Remarks. I share Fauvel's doubt as to whether this species is separable from *P. dumerilii*. I propose, however, for the present to keep Kinberg's name. The two specimens attributed by me (1926, p. 322) to *P. dumerilii* from the Straits of Magellan and South Georgia should therefore be assigned to *P. magalhaensis*.

Of the specimens from Hermite Island, Cape Horn, the largest measures 105 mm. by 7 mm. including the feet, and one is an epitocous female. The various lamellae of the feet (Fig. 37) are not so fully developed as those figured by Ehlers (1897, pl. v, fig. 106) and presumably the metamorphosis is not complete. It is, however, noteworthy that the change to the epitocous condition of the feet begins on the 22nd chaetiger. According to Ehlers in *P. dumerilii* the change begins from the 21st foot and in *P. magalhaensis* from the 26th. The present specimen occurs within the *P. magalhaensis* area, but corresponds to *P. dumerilii* in the disposition of the heteronereid feet. This seems an additional reason for regarding the separation of the two species with suspicion.

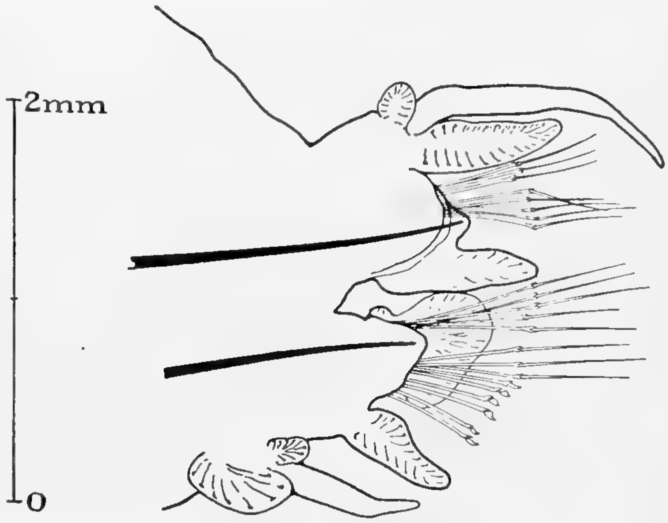


Fig. 37. *Platynereis magalhaensis.* Thirty-fifth foot of epitocous ♀.

St. 56 yielded four young specimens measuring about 7 mm. long, labelled "from carapace of *Paralomis*."

I have examined two specimens labelled by Benham *N. australis*, Schmarda, from the Campbell Islands, but they throw little light on the question whether this species should be identified with *P. magalhaensis*, as Benham and Ramsay claim. The specimens are more massive than any examples of *P. magalhaensis* that I have examined. Moreover, the buccal segment is very short, but this may be the result of improper fixation: the pedal languets are rather thinner and more pointed than is usual in *P. magalhaensis*, but in other respects they appear to be indistinguishable. This is a question that the examination of a large series of specimens alone can decide.

Platynereis dumerilii (Audouin and Milne-Edwards).

Fauvel, 1923, p. 259, fig. 141 *a–f*, with synonymy.

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa. Basin of H.M. Dockyard. 0–2 m. Gear **NH**. Fourteen specimens.

St. MS 82. 6. ix. 26. Off Salamander Point, Saldanha Bay, South Africa. 7–14 m. Gear **BTS**. Eight specimens.

Leptonereis loxechini (Kinberg).

Nicon loxechini, Kinberg, 1865, p. 178.
Nereis loxechini, Ehlers, 1908, p. 73, pl. vii, figs. 8–12; and 1913, p. 497.

St. 6. 1. ii. 26. Tristan da Cunha. 3 miles N 30° E of Settlement. 80–140 m. Gear **DL**. Bottom: rock. Eight specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Eight specimens.

St. 123. 15. xii. 26. Off mouth of Cumberland Bay, South Georgia. From 4·1 miles N 54° E of Larsen Point to 1·2 miles S 62° W of Merton Rock. 230–250 m. Gear **OTL**. Bottom: grey mud. Seven specimens.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH**. Bottom: rock. Twenty-eight specimens.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. Seven specimens.

St. 182. 14. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 21′ 00″ S, 62° 58′ 00″ W. 278–500 m. Gear **OTL**. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 50′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH** and **NRL**. Bottom: stones, mud and rock. One specimen.

St. WS 83. 24. iii. 27. 14 miles S 64° W of George Island, East Falkland Island. From 52° 28′ 00″ S, 60° 06′ 00″ W to 52° 30′ 00″ S, 60° 09′ 30″ W. 137–129 m. Gear **OTC**. Bottom: fine green sand and shell. Six specimens.

St. WS 93. 9. iv. 27. 7 miles S 80° W of Beaver Island, West Falkland Island. From 51° 51′ 00″ S, 61° 30′ 00″ W to 51° 54′ 00″ S, 61° 30′ 00″ W. 133–130 m. Gear **OTC**. Bottom: grey sand. Two specimens.

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. From 49° 00′ 00″ S, 62° 00′ 00″ W to 49° 01′ 00″ S, 61° 56′ 00″ W. 146–145 m. Gear **OTC**. Bottom: sand, gravel and stones. Seventeen specimens.

St. WS 99. 19. iv. 27. 49° 42′ 00″ S, 59° 14′ 30″ W. From 49° 41′ 00″ S, 59° 14′ 00″ W to 49° 43′ 00″ S, 59° 15′ 00″ W. 251–225 m. Gear **OTC**. Bottom: fine dark sand. Fifteen specimens.

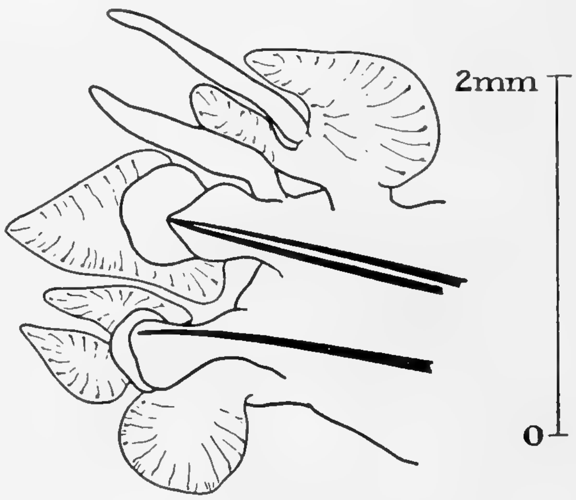


Fig. 38. *Leptonereis loxechini*. Foot of epitocous male. The bristles are omitted.

DESCRIPTION. The largest specimen measures 175 mm. by 8 mm. including the feet. In spirit there are no colour markings. The prostomium is as broad as long with two pairs of large eyes. The tentacles are about half the length of the prostomium, and the palps are very broad and massive with small conical styles. The longest tentacular cirrus reaches back to the 5th–12th chaetiger. There are no paragnaths.

The first two feet are uniramous. A normal anterior foot has two large notopodial languets, the lower slightly shorter and less pointed than the upper, and between them in contact with the dorsal bristle bundle is a third and very much smaller languet. The neuropodial chaeta sac has two unequal lips, the anterior rounded and the posterior longer and conical. The ventral languet is broader and blunter than those of the notopodium. The dorsal cirrus extends for about half its

length beyond the end of the upper dorsal languet, and the ventral cirrus is the same length as the ventral languet. The posterior feet differ from the anterior only in the more slender and pointed character of the languets.

The dorsal bristle bundle contains homogomph spinigers, the upper ventral bundle homogomph spinigers and heterogomph falcigers and the lower ventral bundle heterogomph spinigers and falcigers.

The body ends in a pair of long pygidial styles.

REMARKS. This species differs from *Leptonereis laevis*, Kinberg, from Guajaquil in the shape of the head, the greater size of the eyes and also, as far as I can judge, from his figure, in the shape of the feet. This species is recorded by Ehlers from Kaiser Wilhelm II Land.

The examples from off Tristan da Cunha are doubtfully of this species. They are small and possibly young specimens, measuring about 15 mm. by 2 mm. including the feet. The eyes are relatively rather larger than in the typical forms and the anterior pair is crescentic: the tentacles are also relatively much larger, being about as long as the prostomium. The tentacular cirri reach back to the 15th chaetiger. The languets of the feet are relatively longer and narrower: the intermediate dorsal languet is reduced to a very small process: the anterior face of the ventral chaeta sac ends in a kind of rounded lobe and the posterior lip is carried out into a long digitiform process as long as the languets. The interior of the pharynx is coloured dark red and I can find no trace of paragnaths. I cannot clearly separate these examples from *L. loxechini*, of which they may be young forms.

A number of the specimens from St. 170 had built tubes along the stems of a Hydroid (*Sertularia* sp.).

At St. 123, off South Georgia, was found an epitocous male: the head and first seven chaetigers are modified in the usual manner, the 8th to the 20th feet are of the atokous form, and from the 21st onwards they assume the true heteronereid shape, as shown by the figure (Fig. 38).

Nereis (Eunereis) hardyi, n.sp.

St. WS 86. 3. iv. 27. 53° 53′ 30″ S, 60° 34′ 30″ W. From 53° 53′ 00″ S, 60° 37′ 00″ W to 53° 54′ 00″ S, 60° 32′ 00″ W. 151–147 m. Gear OTC. Bottom: sand, shell and stones. Eight specimens.

St. WS 88. 6. iv. 27. 54° 00′ 00″ S, 64° 57′ 30″ W. From 54° 00′ 00″ S, 65° 00′ 00″ W to 54° 00′ 00″ S, 64° 55′ 00″ W. 118 m. Gear OTC. Bottom: sand, shell and stones. Eight specimens.

St. WS 90. 7. iv. 27. 13 miles N 83° E of Cape Virgins Light, Argentine Republic. From 52° 18′ 00″ S, 68° 00′ 00″ W to 52° 19′ 30″ S, 67° 57′ 00″ W. 82–81 m. Gear OTC. Bottom: fine dark sand. Seven specimens.

St. WS 93. 9. iv. 27. 7 miles S 80° W of Beaver Island, West Falkland Island. From 51° 51′ 00″ S, 61° 30′ 00″ W to 51° 54′ 00″ S, 61° 30′ 00″ W. 133–130 m. Gear OTC. Bottom: grey sand. Three specimens.

DESCRIPTION. Nearly all the adult specimens are incomplete. The largest measures 70 mm. by 3 mm. without the feet and has about 65 chaetigers. There is a young,

complete specimen measuring 38 mm. by 1 mm. without the feet and with 70 chaetigers.

There are brown markings on the head (Fig. 39, *a*) and back and the pedal glands are brown. The length and breadth of the prostomium are about equal: there are two pairs of eyes of equal size. The tentacles are about half the length of the prostomium: the palps are rather long with conical styles. The longest tentacular cirrus reaches to the 5th–6th chaetiger.

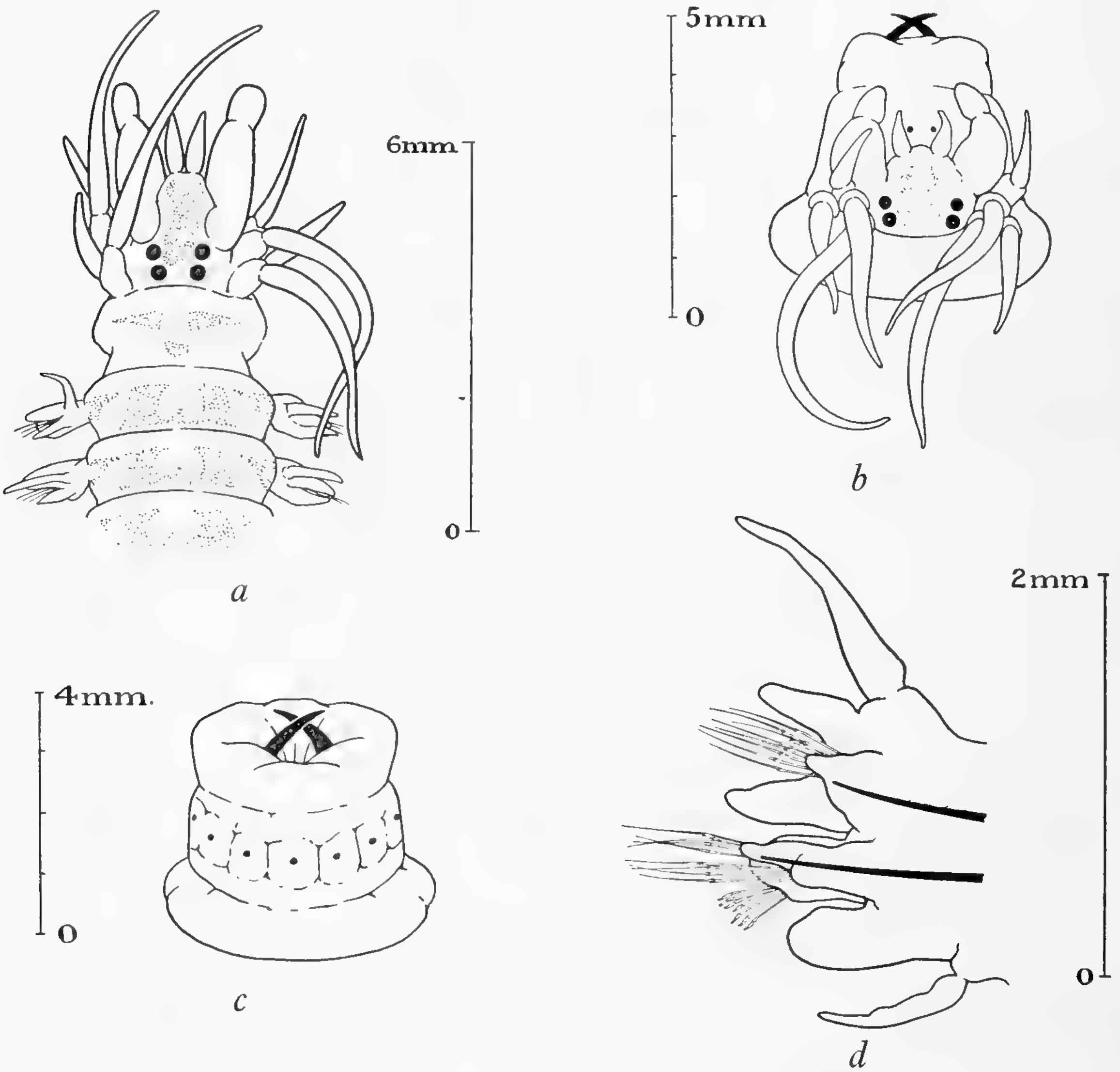


Fig. 39. *Nereis* (*Eunereis*) *hardyi*.

a. Head and anterior segments. *b*. Head and proboscis from above. *c*. Proboscis-ventral aspect. *d*. Foot.

There are no paragnaths on the maxillary ring: on the upper side of the oral ring (Fig. 39, *b*) are two paragnaths side by side both in Group V. Groups VII and VIII (Fig. 39, *c*) are occupied by a single row of seven to eight rather large widely spaced paragnaths. The jaw plates have five very small teeth below the main fang.

The feet (Fig. 39, *d*) are very like those of *N. kerguelensis* and *Leptonereis loxechini*. The notopodium has two conical dorsal languets of about the same size, between which is a third very small languet in contact with the bristles. This third languet disappears in the posterior feet. The neuropodial chaeta sac has two unequal lips, the anterior rounded and the posterior longer and conical. The ventral languet is broader and blunter than those of the dorsal branch. The dorsal cirrus extends for about half its length beyond the end of the upper dorsal languet and the ventral cirrus is the same length as the ventral languet. The dorsal bristle bundle contains homogomph spinigers, the upper ventral bundle homogomph spinigers and heterogomph falcigers and the lower ventral bundle a single heterogomph spiniger and heterogomph falcigers.

There is a pair of long pygidial styles at the end of the body.

REMARKS. In its general appearance and in the shape of its feet this species is close to *N. kerguelensis*. The intermediate dorsal languet is not so fully developed; there are no paragnaths in the maxillary ring and there is a single heterogomph spiniger in the lower ventral bristle bundle. I have not been able to find any heterogomph spinigers in *N. kerguelensis*.

I have named this species after Prof. A. C. Hardy, the resourceful second in command of the expedition.

Ceratonereis vittata, Langerhans.

Langerhans, 1884, p. 254, pl. 15, fig. 12 *a–e*.
Fauvel, 1916, p. 86, pl. vi, figs. 9–11; pl. ix, figs. 16–20.
Ceratonereis rolasiensis, Augener, 1918, pl. iii, fig. 64–65; pl. iv, fig. 78, text-fig. 16.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. One specimen.

REMARKS. The specimen from St. 283 corresponds in detail to Langerhans' description and figures. The very sparse paragnaths are distinctive. The colour markings are similar to those figured by Augener for his *C. rolasiensis*, which does not seem to be separable from this species. The specimen is atocous, and I have not sufficient material to add anything to the already published accounts of this species.

Family NEPHTHYDIDAE

Genus **Nephthys,** Cuvier

Nephthys macrura, Schmarda.

Fauvel, 1916, p. 436, pl. viii, figs. 1–3, with synonymy.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Three specimens.

St. 28. 16. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 45° W of Jason Light. 168 m. Gear **DC**. Bottom: mud. One specimen.

St. 29. 16. iii. 26. West Cumberland Bay, South Georgia. 5·9 miles S 51° W of Jason Light. 23 m. Gear **DC**. Bottom: mud and stones. Nine specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Eight specimens. Gear **NCS–T**. Three specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. Six specimens.

St. 143. 30. xii. 26. Off mouth of East Cumberland Bay, South Georgia. 54° 12′ S, 36° 29′ 30″ W. 273 m. Gear **OTL**. Bottom: mud. Two specimens.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **N 4–T**. Bottom: green mud and sand. Two specimens.

St. 146. 8. i. 27. 53° 48′ 00″ S, 35° 37′ 30″ W. 728 m. Gear **DLH**. Bottom: rock. Three specimens.

St. 148. 9. i. 27. Off Cape Saunders, South Georgia. From 54° 03′ S, 36° 39′ W to 54° 05′ S, 36° 36′ 30″ W. 132–148 m. Gear **OTL**. Bottom: grey mud and stones. Two specimens.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N 76½° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. Six specimens.

St. 157. 20. i. 27. 53° 51′ 00″ S, 36° 11′ 15″ W. 970 m. Gear **DLH**. Bottom: diatomic ooze, stones and fine sand. Seven specimens.

St. 159. 21. i. 27. 53° 52′ 30″ S, 36° 08′ 00″ W. 160 m. Gear **DLH**. Bottom: rock. Two specimens.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stones and rock. Three specimens.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. One specimen.

St. 173. 28. ii. 27. Port Foster, Deception Island, South Shetlands. Close to SE shore, near Lake Point. 5–60 m. Gear **BTS**. Four specimens.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. Three specimens.

St. 180. 11. iii. 27. 1·7 miles W of N Point of Gand Island, Schollaert Channel, Palmer Archipelago. 160 m. Gear **DLH**. Bottom: mud and stones. Three specimens.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. Fifty-two specimens.

St. 182. 14. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 21′ 00″ S, 62° 58′ 00″ W. 278–500 m. Gear **N 7–T**. Bottom: mud. Fifteen specimens.

St. 186. 16. iii. 27. Fournier Bay, Anvers Island, Palmer Archipelago. 64° 25′ 30″ S, 63° 02′ 00″ W. 295 m. Gear **DLH**. Bottom: mud. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 315 m. Gear **DLH**. Bottom: mud and rock. Two specimens.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear **OTM**. Bottom: mud and stones. Three specimens. Gear **DLH**. Two specimens.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear **BTS**. Bottom: mud and sand. Two specimens.

St. WS 32. 21. xii. 26. Mouth of Drygalski Fiord, South Georgia. 225 m. Gear **BTS**. Bottom: grey mud. Seven specimens.

St. WS 33. 21. xii. 26. 54° 59′ 00″ S, 35° 24′ 00″ W. 130 m. Gear **N 100 H**. Bottom: grey mud and stones. Two specimens.

St. MS 15. 17. ii. 25. East Cumberland Bay, South Georgia. 3 miles SW of Merton Rock to $2\frac{1}{4}$ miles NNW of Dartmouth Point. 110 m. Gear **DS**. One specimen.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S $\frac{1}{2}$ E to $8\frac{1}{2}$ cables SE × E of Sappho Point. 220–247 m. Gear **NCS–N** and **NRL**. Fifteen specimens.

Remarks. There is very wide variation in the shape of the feet in this species on a ground plan of a rounded upper dorsal lamella, a lower dorsal lamella that is always gathered to a point at its apex and a lanceolate ventral lamella. I cannot discover any correlation between the size of the individual and the degree of the development of the lamellae: in the larger specimens the lamellae are usually relatively small, and in individuals of about the same size there are wide differences in the size and shape of the lamellae. St. 143, off South Georgia, yielded the largest example, measuring 200 mm. by 13 mm. without the feet.

From St. 173 (South Shetlands) there came four specimens in every way typical of this species, but the lower border of the ventral lamella is serrated. They are quite distinct from *N. serratifolia*, Ehlers, and indistinguishable in every other character from *N. macrura*. I do not regard these serrations as even of varietal value. St. MS 68 (South Georgia) yielded a number of young examples, measuring about 10 mm. by 1 mm. including the feet.

Nephthys lyrochaeta, Fauvel.

Fauvel, 1902, p. 72, text-figs. 9 and 10.
Augener, 1918, p. 160, pl. ii, fig. 12; pl. iii, fig. 59.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo. From 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. 58–67 m. Gear **OTL**. Bottom: mud and fine sand. Four specimens.

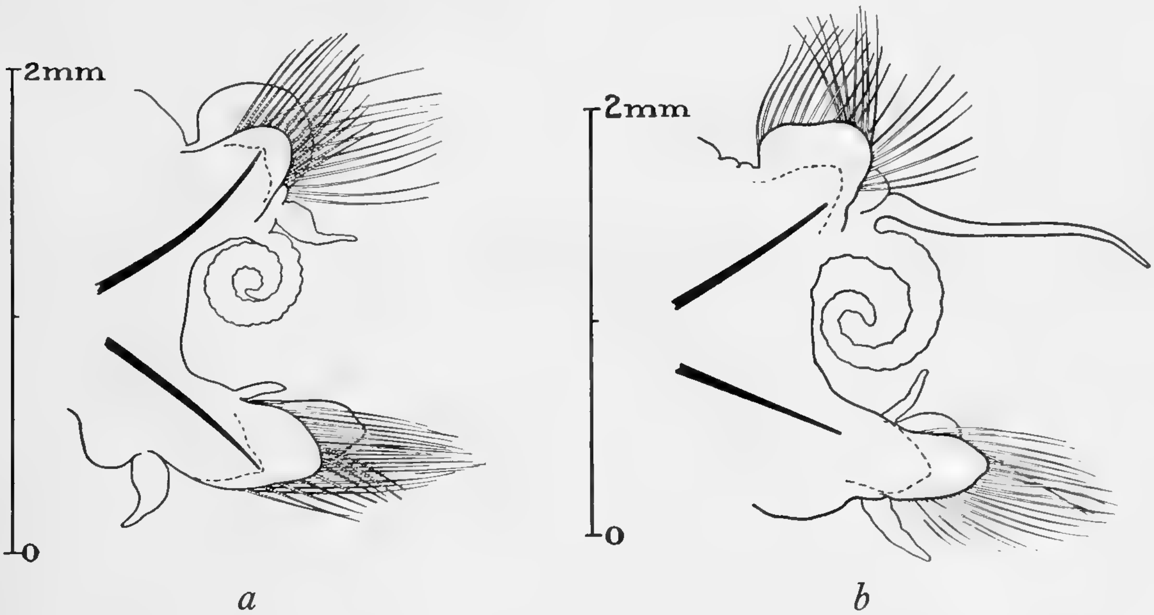


Fig. 40. *Nephthys lyrochaeta*.
a. Fifteenth foot. *b*. Thirty-fifth foot.

REMARKS. Four anterior fragments, the largest of which has about 40 chaetigers and measures 18 mm. by 3 mm. including the feet.

The proboscis was withdrawn in all the specimens, which makes the examination of the papillae impracticable. These examples do not altogether agree with Augener's description, especially as regards the dorsal cirri of the anterior segments. The first two chaetigers are biramous and not uniramous as stated by Augener: in this they agree with Fauvel's original description. Moreover, the 1st chaetiger has a long ventral tentacular cirrus, the 2nd has an equally long thread-like dorsal cirrus, and the 3rd has a shorter but still thread-like dorsal cirrus, intermediate in size between that of the 2nd and 4th chaetigers. For about the following twenty chaetigers (Fig. 40, *a*) the dorsal cirri are very short and thick; and between the 20th and 25th chaetigers they lengthen to form the long filiform process shown in Augener's figure (*loc. cit.* pl. iii, fig. 59).

The middle feet (Fig. 40, *b*) correspond to Augener's description and figures. The pedal lobes are conical. The dorsal ramus has a fairly large delicate rounded posterior lamella and a very small anterior lamella: below this is the very long dorsal cirrus and the gill. The ventral ramus has a dorsal cirriform process, a large lanceolate posterior lamella and a small conical anterior lamella. Behind the ventral cirrus the skin is expanded into a small oval membrane.

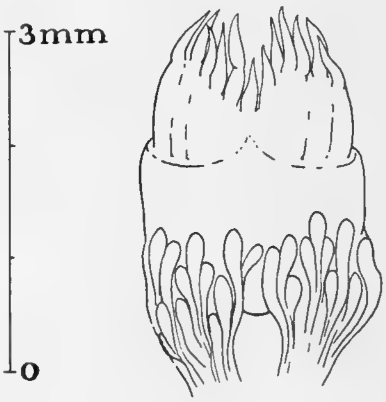
Ehlers' *Nephthys inermis*, besides having no papillae, lacks the dorsal cirri of the 2nd and 3rd chaetigers.

Nephthys serratifolia, Ehlers.

Ehlers, 1897, p. 24, pl. i, fig. 13.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 115 m. Gear **DLH**. Bottom: fine sand. Six specimens.

a



b

Fig. 41. *Nephthys serratifolia*.
a. Foot. *b*. Proboscis dissected out.

St. WS 79. 13. iii. 27. 51° 01′ 30″ S, 64° 59′ 30″ W. From 51° 00′ 00″ S, 65° 00′ 00″ W to 51° 03′ 00″ S, 64° 59′ 00″ W. 132–131 m. Gear **N 7–T**. Bottom: fine dark sand. One specimen.

St. WS 91. 8. iv. 27. 52° 53′ 45″ S, 64° 37′ 30″ W. From 52° 54′ 30″ S, 64° 39′ 00″ W to 52° 53′ 00″ S, 64° 36′ 00″ W. 191–205 m. Gear **OTC**. Bottom: fine dark sand and shell. One specimen.

REMARKS. This species has a rounded upper posterior dorsal lamella (Fig. 41, *a*), a slender lanceolate lower posterior dorsal lamella, a cirriform process at the base of the gill, a slender anterior digitiform process, a laciniated posterior ventral lamella with about five digitiform processes and a small pointed anterior ventral lamella.

Behind the ventral cirrus there is also a scale-like process similar to that figured by Ehlers. In all the examples the proboscis (Fig. 41, *b*) was withdrawn, but dissection showed a number of short rows of long papillae in addition to the usual large papillae at the apex.

Family SPHAERODORIDAE

Genus **Ephesia**, Rathke

Ephesia antarctica, McIntosh.

McIntosh, 1885, p. 361, pl. xliv, fig. 5; pl. xxii A, figs. 22–23.
Ehlers, 1908, p. 107, pl. xiv, figs. 7–13.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH**. Bottom: rock. Four specimens.

Family GLYCERIDAE

Genus **Glycera**, Savigny

Glycera capitata, Oersted.

Fauvel, 1923, p. 385, fig. 151 *a–e*.

St. 4. 30. i. 26. Tristan da Cunha. 36° 55′ 00″ S, 12° 12′ 00″ W. 40–46 m. Gear **DL**. Bottom: stones. One specimen.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Two specimens.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 42. 1. iv. 26. Off mouth of Cumberland Bay, South Georgia. From 6·3 miles N 89° E of Jason Light to 4 miles N 39° E of Jason Light. 120–204 m. Gear **OTL**. Bottom: mud. One specimen.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Eight specimens.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **NCS–T**. Bottom: fine sand. One specimen. Gear **OTL**. Twelve specimens.

St. 55. 16. v. 26. Entrance to Port Stanley, East Falkland Island. 2 cables S 24° E of Navy Point. 10–16 m. Gear **BTS**. One specimen.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. One specimen.

St. 123. 15. xii. 26. Off mouth of Cumberland Bay, South Georgia. From 4·1 miles N 54° E of Larsen Point to 1·2 miles S 62° W of Merton Rock. 230–250 m. Gear **OTL**. Bottom: grey mud. Three specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. Two specimens.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **N 4–T**. Bottom: green mud and sand. Two specimens. Gear **NCS–T**. Two specimens.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N 76½° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. One specimen.

St. 159. 21. i. 27. 53° 52′ 30″ S, 36° 08′ 00″ W. 160 m. Gear **DLH**. Bottom: rock. Two specimens.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stone and rock. One specimen.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. One specimen.

St. 177. 5. iii. 27. 27 miles SW of Deception Island, South Shetlands. 63° 17′ 30″ S, 61° 17′ 00″ W. 1080 m. Gear **DLH**. Bottom: mud and stones. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 126 m. Gear **NRL**. Bottom: stones, mud and rock. One specimen.

St. WS 84. 24. iii. 27. 7½ miles S 9° W of Sea Lion Island, East Falkland Island. From 52° 33′ 00″ S, 59° 08′ 00″ W to 52° 34′ 30″ S, 59° 11′ 00″ W. 75 m. Gear **OTC**. Bottom: sand and shell. One specimen.

St. WS 86. 3. iv. 27. 53° 53′ 30″ S, 60° 34′ 30″ W. From 53° 53′ 00″ S, 60° 37′ 00″ W to 53° 54′ 00″ S, 60° 32′ 00″ W. 151–147 m. Gear **OTC**. Bottom: sand, shell and stones. One specimen.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. One specimen.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. 9¼ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **BTS**. One specimen.

Remarks. There is a certain amount of variation in the relative length of the pedal lips, but otherwise these specimens are uniform.

I am doubtful of the necessity of keeping *G. capitata* and *G. lapidum* separate. They are usually distinguished on the following characters: *G. capitata* has eight prostomial rings, the support of the jaws is hardly, if at all, notched in the middle and the bristles of the lower bundle are all of the same size. *G. lapidum* has eleven prostomial rings, the support of the jaws is deeply notched in the middle, the ventral cirrus is more pointed and downwardly directed than in *G. capitata*, and the upper and lower bristles of the ventral ramus are stouter than the rest.

Regarding the number of prostomial rings, in the majority of these specimens this cannot be counted with sufficient accuracy to be of any differential value: the supports of the jaws are in many examples deeply notched and with one arm elongated: as a specific differential this character seems to be valueless. Moreover, the extent to which

the ventral cirrus is pointed and obliquely directed downwards appears to be variable, and is at any rate difficult to distinguish except within wide limits. The bristles, on the other hand, are very uniform in size and show no differences between the middle bristles of the ventral ramus and the rest.

I am inclined to regard *G. capitata* and *G. lapidum* as one species.

Glycera tesselata, Grube.

Ehlers, 1868, p. 654, pl. xxiv, figs. 2 and 33–34.
Augener, 1918, p. 394, pl. v, fig. 131, text-fig. 49.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. One specimen.

Remarks. A single specimen measuring 19 mm. by 2 mm. including the feet. I am unable to add anything to the already existing accounts of this species.

Glycera convoluta, Keferstein.

Fauvel, 1923, p. 383, fig. 150 *a–h*.
Glycera tridactyla, Schmarda, Augener, 1918, p. 386, pl. v, figs. 142–143, text-fig. 47, with synonymy.

St. 4. 30. i. 26. Tristan da Cunha. 36° 55′ 00″ S, 12° 12′ 00″ W. 40–46 m. Gear **DL**. Bottom: stones. Three specimens.

Remarks. The specimens from St. 4 are all in bad condition: the largest measures 128 mm. by 7 mm., including the feet, at its broadest part.

The gill begins on the 12th chaetiger and in the anterior segments reaches slightly beyond the end of the bristles: in the hinder segments it is considerably longer. The feet consist of two pointed anterior lips, an upper posterior lip resembling in size and shape the upper anterior lip and a shorter rounded lower posterior lip. There is a triangular ventral cirrus. The small button-like dorsal cirrus is set low down just above the foot. The papillae and the supports of the jaws are of the usual shape for the species. The lips of the foot and especially the ventral cirrus are more prominent than those figured by Augener for his South-West African specimens: and in this relation Augener separates *G. africana*, Arwidsson, from the present species on the ground that the pedal lips and ventral cirri are more pointed and prominent in the former species, and regards *G. africana* as the tropical representative of *G. convoluta*, which occurs in the more temperate zones to the north and south.

I find it hard to believe that the distinction between the two species is valid, for in the shape of their feet the examples from Tristan da Cunha seem to be nearer to *G. africana* than to *G. convoluta*. Augener claims that *G. tridactyla*, Schmarda 1861, is the same as *G. convoluta*, Keferstein 1862. I prefer to retain the familiar name.

Genus **Goniada**, Audouin and Milne-Edwards

Goniada congoensis, Grube.

Arwidsson, 1898, p. 41, figs. 34 and 62.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola. From 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. 64–65 m. Gear **OTL**. Bottom: grey mud. Two specimens.

REMARKS. The larger specimen from St. 274 measures 147 mm. by 3 mm. without the feet. The number of chevrons on the pharynx is 14 and there are 44 paragnaths: the larger jaw plates have four teeth. The biramous feet begin at the 28th chaetiger. The feet are well figured by Arwidsson.

Augener (1918, p. 396) regards *G. hupferi*, Arwidsson, as a young form of this species.

Family EUNICIDAE, sensu Grube

Sub-family *EUNICINAE*, Kinberg

Genus **Eunice**, Cuvier

Eunice pennata (O. F. Müller).

Fauvel, 1923, p. 400, fig. 156 *h–o*.
Eunice norvegica, Augener, 1928, p. 727, with synonymy.

St. 6. 1. ii. 26. Tristan da Cunha. 3 miles N 30° E of Settlement. 80–140 m. Gear **DL**. Bottom: rock. One specimen.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 115 m. Gear **DLH**. Bottom: fine sand. One specimen.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH**. Bottom: rock. Six specimens.

St. 156. 20. i. 27. 53° 51′ 00″ S, 36° 21′ 30″ W. 200–236 m. Gear **DLH**. Bottom: rock. Ten specimens.

St. 157. 20. i. 27. 53° 51′ 00″ S, 36° 11′ 15″ W. 970 m. Gear **DLH**. Bottom: diatomic ooze, stones, fine sand. One specimen.

St. 159. 21. i. 27. 53° 52′ 30″ S, 36° 08′ 00″ W. 160 m. Gear **DLH**. Bottom: rock. One hundred and ten specimens.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stones and rock. Fifty-five specimens.

REMARKS. The colour in spirit is pale brown, and an average specimen measures about 80 mm. by 4 mm. including the feet, and has about 100 chaetigers. The head is only slightly indented in front. The tentacles are not strictly moniliform but constricted at intervals into a number of articles of different length. The median tentacle reaches back to the 3rd–4th chaetiger, and the outer lateral tentacles are about half the length of the inner lateral. The tentacular cirri reach to the anterior edge of the buccal segment; these are indistinctly annulated. The buccal segment is equal in length to the two following segments. The gills begin with a single filament on the 3rd (very rarely

on the 5th) segment and end between the 40th and 45th segments. Very rarely they are continued to about the 60th chaetiger. They are at their maximum development between the 20th and 30th chaetigers, where they are usually composed of 7–8 filaments. One large specimen from St. 152 has as many as 15 filaments. The acicula are yellow, as is also the hooded bidentate subacicular chaeta which begins between the 30th and 35th chaetigers. The comb chaetae have the lateral tooth of one side much elongated. There are two pairs of pygidial styles, the upper long and the lower very short.

The anterior edge of the lower jaw plates (Fig. 42, *a*) is calcareous and irregular, often with three more or less distinct teeth.

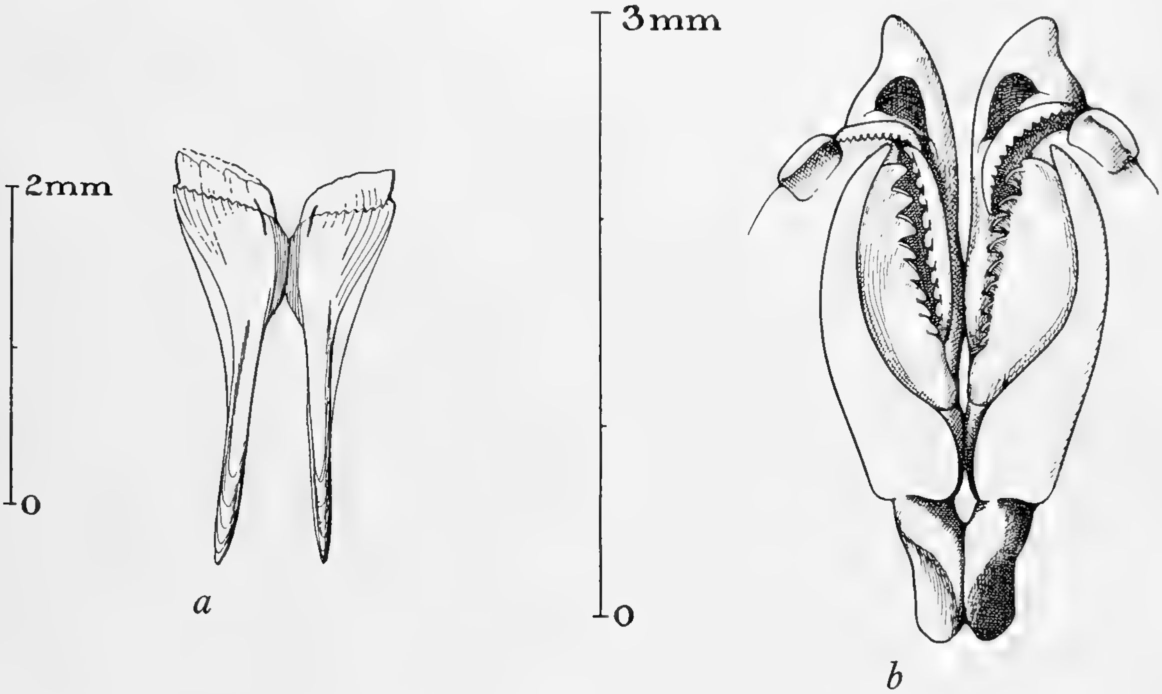


Fig. 42. *Eunice pennata.*
a. Lower jaw plates. *b.* Upper jaws.

The dental formula (Fig. 42, *b*) is as follows: 8 or 9—9 : 9 or 10 + 7 or 8—12. Maxilla V is represented by a small chitinous plate.

These specimens seem to me to be indistinguishable from a rather small example of the uncommon deep water European species. Augener and Fauvel give the length as between 60 and 150 mm. Fauvel gives the number of gill filaments in a fully developed branchia as between 8 and 17, and Augener as between 10 and 22. In these specimens 8–15 is the maximum. Fauvel states that the gills cease between the 30th and 46th segments and Augener about the 60th segment. In these specimens they usually cease between the 40th and 45th segments.

This species is closely related to *E. atlantica*, Kinberg.

Ehlers (1901, p. 125) gives an account of a small example of the latter species measuring 41 mm. long and with 124 chaetigers. In this the median tentacle reaches back to the 9th segment (7th chaetiger) and the first and second segments are together equal

in length to the five following segments. The gills extend from the 3rd to the 60th chaetigers and have a maximum of 20 branches.

The dental formula is 10—12 : 10 + 4—9.

Another small specimen measuring 30 mm. long described by Ehlers (1908, p. 87) has gills extending from the 3rd to the 35th chaetiger and a maximum of four branches: the ventral cirrus has an elongated thread-like tip.

The dental formula is 7—8 : 7 + ?—?: Ehlers' figure of the upper jaws is not very clear.

I think it rather doubtful that the specimen ascribed with hesitation to *E. atlantica* by Ehlers in 1901 is conspecific with the one described by him in 1908.

Eunice savignyi, described by Grube from the Philippines and by Ehlers (1908, p. 88) from 500 m. off the Cape of Good Hope, is also very close to, if not identical with, *E. pennata*. The median tentacle reaches back to the 6th chaetiger: the first two segments are not as long as the first three chaetigers. The gills extend from the 3rd to the 40th chaetigers and have a maximum of 6–7 branches. He records a single pair only of anal cirri.

The dental formula is 7—6 : 7 + 7—6. The acicula and bristles are similar to those described for *E. pennata*.

According to Augener *E. pennata*, O.F.M., is identical with *Nereis norvegica*, Linnaeus (*partim*).

Eunice siciliensis, Grube.

Fauvel, 1923, p. 405, fig. 159 *e–m*.
Augener, 1918, p. 327.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. Five specimens.

Remarks. These specimens were taken, together with examples of *E. longicirrata*, *E. vittata* and *Nicidion edentulum*.

Eunice vittata (Delle Chiaje).

Fauvel, 1923, p. 404, fig. 158 *h–n*.
Augener, 1918, p. 321.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. Fifteen specimens.

Remarks. The anterior ends of 15 young specimens, the largest of which measures 30 mm. by 1 mm. without the feet for 55 chaetigers. I can discover no annulation of the tentacles. The gills begin on the 3rd and end about the 35th chaetiger and their maximum number of filaments is five. I see only one tridentate subacicular chaeta.

The dental formula is 12—11 : 9 + 10—15.

I can see nothing to separate this species from *E. indica*, Kinberg, a good account of which is given by Crossland (1904, p. 318).

Eunice longicirrata, Webster.

Treadwell, 1921, p. 11, pl. i, figs. 1–4, text-figs. 3–12.
Eunice articulata, Ehlers, 1887, p. 83, pl. xxiv, figs. 8–10.
Eunice antillensis, Ehlers, 1887, p. 84, pl. xxiv, figs. 5–7.
Augener, 1918, p. 314.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. Fifteen specimens.

REMARKS. The largest complete specimen measures 160 mm. by 3 mm. including the feet.

The body is extremely slender and not thickened in the anterior region as is usual in the genus. The colour is a pale gold: the 4th chaetiger is colourless and the segmental grooves are marked with a thin colourless band which widens slightly from before backwards. Towards the middle of the body this colourless band widens out into a triangular spot in the mid-dorsal line. The colour of the ventral surface is lighter than that of the dorsal. The tentacles, tentacular cirri and dorsal cirri of about the first seven segments are strongly moniliform with a brown colour band at each constriction. Further back the segmentation of the dorsal cirri is not so clear and the banding appears less regular.

The prostomium is deeply incised in front: the median tentacle reaches to the 4th chaetiger and the two lateral pairs are shorter. The tentacular cirri are unusually long, reaching to the end of the prostomium.

The 1st segment is equal in length to the first two chaetigers, and the 2nd segment is about half the length of the 1st chaetiger.

The gills begin as a single filament at the 3rd chaetiger and are continued for 80–100 chaetigers. There are usually about 40 post-branchial segments, but in one posterior fragment I counted as many as 80. The maximum number of filaments in these specimens is four. At about the 15th chaetiger reduction in the number of filaments begins, and at the 35th chaetiger a single filament remains; this persists to the end of the gill-bearing region. The gills are never more than half the length of the dorsal cirri.

The ventral cirrus is a stout subulate structure till the 5th foot, where it becomes mammiform: at about the 30th foot it lengthens out again into a tapering process. At the 30th foot the black bidentate subchaetal spine appears.

The foot is supported by a pair of large black acicula with tapering ends. The compound bristles are clearly bidentate and the comb chaetae have long terminal teeth. The bristles are figured by Treadwell.

The dental formula is 6—5 : 7 + 6—10. The under jaws have calcareous end-pieces with jagged irregularly toothed edges. The upper jaws are well figured by Treadwell.

E. articulata, Ehlers, is treated by Treadwell as a synonym of the present species, and a comparison of these specimens with Augener's account of his examples of *E. antillensis*, Ehlers, from the Gulf of Guinea has made me strongly of the opinion that *E. antillensis* is also a synonym of this species. Like the allied *E. coccinea*, it is very variable in coloration and in the number and arrangement of the gills.

According to Treadwell's account the gills begin on the 5th somite (3rd chaetiger?) and disappear at about the 58th somite: they have a maximum of 15 or more filaments. In *E. articulata* Ehlers records the gills as ending between the 30th and 48th segments and as having a maximum of 13 filaments.

Ehlers again writes that the gills of his *E. antillensis* extended from the 4th to the 40th foot and had a maximum of six filaments. Augener's specimens had gills extending from the 3rd to the 55th feet with a maximum of five or six filaments.

There is also much variation in the recorded relative lengths of the tentacles. In Augener's specimens the unpaired tentacle reached to the 10th chaetiger. Ehlers gives the 20th segment (18th chaetiger) for both his *E. antillensis* and his *E. articulata.* Treadwell gives the 8th somite (6th chaetiger) for the length attained by the unpaired tentacle in his specimens, and in the present examples it reaches only to the 4th chaetiger.

The present species is characterised by the very long tentacular cirri and by the great length of the dorsal cirri in proportion to the gills.

Eunice rousseaui, Quatrefages.

Fauvel, 1923, p. 403, fig. 158 *a–g*, with synonymy.

Saldanha Bay Beach, South Africa.

REMARKS. A large specimen measuring 220 mm. by 9 mm. without the feet.

Eunice murrayi, McIntosh.

McIntosh, 1885, p. 288, pl. xxxix, figs. 7–8; pl. XX A, figs. 19–20; and 1924, p. 26.

St. 91. 8. ix. 26. ·5 mile off Roman Rock, False Bay, South Africa. 35 m. Gear **NRL**. Bottom: sand. Three specimens.

REMARKS. Three small and ill-preserved specimens, two of which are incomplete. The complete example measures 38 mm. by 1 mm. without the feet and has about 80 chaetigers. The gills begin at the 3rd chaetiger, have about four filaments at the 8th chaetiger, rapidly reach their maximum number of nine to ten branches and disappear by about the 35th chaetiger. McIntosh's type specimen has from about the 30th foot onwards two yellow tridentate subacicular crochets: in these specimens there is only a single tridentate crotchet to each foot. On the other hand, McIntosh in commenting on a specimen dredged at 240 fathoms off the Cape (*loc. cit.* 1924) writes, "a stout winged crochet," as if in that specimen there were only one.

The jaws are well figured by McIntosh. The dental formula is as follows: 6—7 : 7 + 7—8.

With the material at my disposal there is nothing I can add to McIntosh's account.

According to Augener this species is a synonym of *E. australis*, Quatrefages.

Genus Nicidion, Kinberg

Nicidion kinbergii, Webster.

Webster, 1884, p. 320, pl. xii, figs. 81–88.
Treadwell, 1921, p. 91, pl. vi, figs. 5–8, text-figs. 324–332.

St. 1. 16. xi. 25. Clarence Bay, Ascension Island. 7° 55′ 15″ S, 14° 25′ 00″ W. 16–27 m. Gear **NRM.** Bottom: coral, sand and shell. Two specimens.

REMARKS. The largest of the two incomplete specimens measures 13 mm. by 1 mm. including the feet and has about 65 chaetigers. The colour in spirit is a pale brown. The prostomium is deeply incised in front and the tentacles are short, the median, which is the longest, barely reaching to the 2nd chaetiger. The tentacular cirri are so small as easily to be overlooked.

The flattened area of the body with the short crowded segments extends from about the 5th to the 40th segments, about ten segments further back than in Crossland's (1904, p. 327) *Nicidion gracilis*. Moreover, the change over to the longer and more arched condition of the posterior somites is much more gradual than as recorded by Crossland for his species.

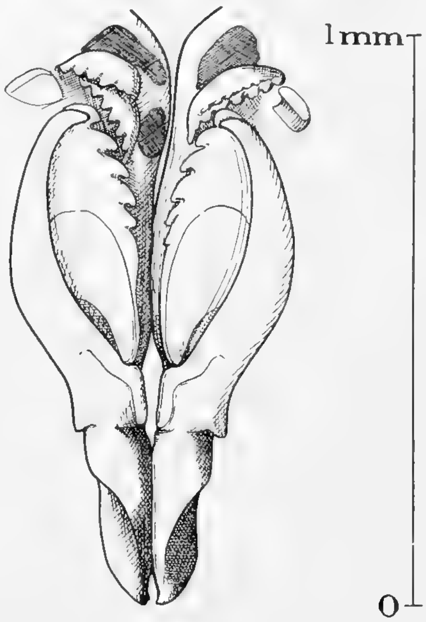


Fig. 43. *Nicidion kinbergii.* Upper jaws.

For the first five feet, there is a stout dorsal cirrus reaching to the tips of the bristles, and a stout conical ventral cirrus. By the 10th chaetiger the dorsal cirrus is much reduced and the ventral cirrus is a conical projection on top of a glandular pad. By the 25th the dorsal cirrus is still further reduced in size and the ventral cirrus is a mere button. At the 50th chaetiger the dorsal cirrus is a slight digitiform process as in the 25th foot and the ventral cirrus is again a small conical process.

The bristles agree with those figured by Treadwell. At about the 35th chaetiger the bidentate acicular chaeta appears, and at the same time the yellow aciculum gives place to a stouter black aciculum.

The dental formula (Fig. 43) is 5—5 : 5 + 4—6. Details of the jaws are given in the figure.

N. gracilis, Crossland, *N. brevis*, Ehlers (1887, p. 98), and the present species are all closely allied. In addition to the differences between *N. gracilis* and *N. kinbergii* already mentioned, Crossland makes no reference to the winged type of capillary bristle such as is present in Webster's species.

Ehlers' *N. brevis* from Key West has slightly different upper jaws and the secondary lateral supports to the lower jaws figured by Ehlers (Pl. xxix, fig. 2) are absent from the present species.

Nicidion edentulum, Ehlers.

Fauvel, 1914, p. 128, pl. vii, figs. 10–12.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. Four specimens.

REMARKS. These specimens are all incomplete posteriorly. The largest measures 105 mm. by 2 mm. without the feet, for 165 chaetigers.

They were found with a number of *Eunice siciliensis*, from which this species seems to be indistinguishable except for the absence of gills. Fauvel's suggestion that *N. edentulum* may be a gill-free variety of *E. siciliensis* seems to me to be plausible.

Sub-family *ONUPHIDINAE*, Levinsen

Genus **Diopatra**, Audouin and Milne-Edwards

Diopatra cuprea (Bosc).

Augener, 1918, p. 350, text-fig. 39, with synonymy, excluding *D. punctifera*, Ehlers.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola. From 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. 64–65 m. Gear **OTL**. Bottom: grey mud. Eighteen specimens.

REMARKS. The largest of these specimens measures 185 mm. by 5 mm. without the feet. The gills begin on the 4th or 5th chaetiger and end between the 35th and 40th. The three posterior occipital tentacles have 18 rings to their tentaculophores and the paired tentacles reach back to the 14th–16th chaetiger. The comb chaetae have about 20 teeth. There are no tubes.

I have nothing to add to Augener's article on this species. I give my reasons for doubting that *D. punctifera*, Ehlers, is synonymous with *D. cuprea* in my remarks on the former species.

Diopatra punctifera, Ehlers.

Ehlers, 1908, p. 79, pl. x, figs. 1–11.

St. WS 4. 30. ix. 26. 32° 45′ 00″ S, 18° 10′ 00″ E. 45–47 m. Gear **DL**. Fourteen specimens.

REMARKS. An average specimen measures about 75 mm. by 4 mm. without the feet. The colouring is similar to that of *D. cuprea*. The posterior occipital tentacles have eight rings to their ceratophores and the paired tentacles reach back to the 4th chaetiger. The comb chaetae are wide at the apex and have 15–20 teeth. The gills begin on the 5th chaetiger and are continued for about 40 segments.

The dental formula (Fig. 44, *a*) is 7—8 : 7 + 6—9, and the upper jaws resemble Ehlers' figure.

These specimens correspond closely to Ehlers' description and figures except in the structure of the lower jaw plates (Fig. 44, *b*). These are black except for the calcareous end-pieces, very thick, heavy and spatulate: they are widely different from those figured by Ehlers. It may be unjustifiable to refer these specimens to Ehlers' species, when

the lower jaw plates differ so widely, but I do not know to what extent these are liable to vary within the species.

Among these specimens there are five preserved in their tubes: the latter are round in section and have a thick layer of mud overlying the tough parchmenty basis. Inside one of these tubes were a number of young specimens together with the parent: these specimens measure about 15 mm. by 1 mm., and are at a much later stage of development than the post-larval *Diopatra cuprea* described by Monro (1924, p. 193). They were not very well preserved within the tube, but as far as I can discover, they do not differ from the adult form except in size. Augener (1918, p. 354) regards this species as identical

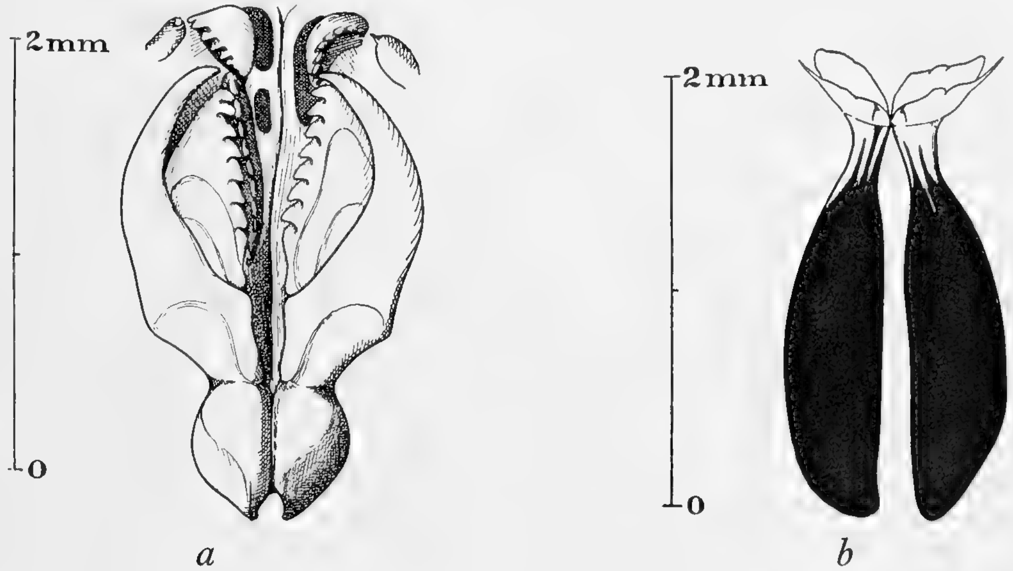


Fig. 44. *Diopatra punctifera*.
a. Upper jaws. *b*. Lower jaw plates.

with *D. cuprea*. I can only say that in the examples of the latter species examined by me the relative length of the occipital tentacles and the number of rings to their ceratophores seem to be constantly greater than in Ehlers' species. Ehlers' specimens came from 35° 19′ S, 20° 15′ E.

Genus **Epidiopatra**, Augener

Epidiopatra hupferiana, Augener.

Augener, 1918, p. 355, pl. v, figs. 104–106; pl. vi, fig. 212, text-fig. 40.

St. 91. 8. ix. 26. ·5 mile off Roman Rock, False Bay, South Africa. 35 m. Gear NRL. Bottom: sand. Two specimens.

REMARKS. Two small specimens incomplete posteriorly: the larger measures 10 mm. by 1 mm. including the feet and has 32 chaetigers. They agree with Augener's description.

There are no tentacular cirri. The ventral cirrus and the cirriform prolongation of the posterior lip of the chaeta sac disappear by the 4th chaetiger. The pseudo-compound

bidentate bristles of the first four feet are as figured by Augener. The comb chaetae (Fig. 45, *a*) have about 12 rather long closely set teeth. The capillary bristles (Fig. 45, *b*) have a distinct narrow border along both edges. There is a pair of large yellow subacicular bidentate hooks (Fig. 45, *c*). The gills begin on the 4th chaetiger and there are only three pairs in all. They have a long thick stem with a crown of spiral filaments.

Regarding the jaws, I cannot with my present material discover the shape of the carriers; otherwise they resemble Augener's figure. The dental formula is 9—10 : 10 + 7—8.

I have rather doubtfully referred these two fragments to Augener's species.

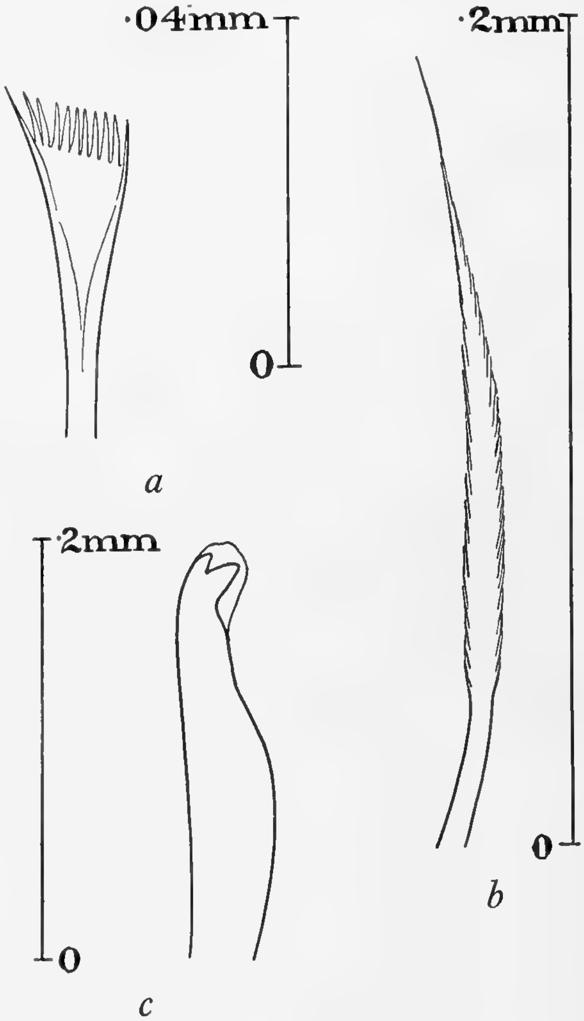


Fig. 45. *Epidiopatra hupferiana.*
a. Comb chaeta. *b.* Capillary bristle. *c.* Subchaetal hook.

Genus **Rhamphobrachium**, Ehlers

Rhamphobrachium ehlersi, n.sp.

St. 172. 26. ii. 27. Off Deception Island, South Shetlands. 62° 59′ 00″ S, 60° 28′ 00″ W. 525 m. Gear **DLH.** Bottom: rock. Two specimens.

DESCRIPTION. Two fragments incomplete posteriorly. The larger measures 28 mm. by 4 mm. including the feet and has 35 chaetigers. In spirit there are no colour markings. There is a pair of globular anterior tentacles. All the remaining tentacles are short and thick. The outer laterals are spindle-shaped with massive tentaculophores: the inner laterals are more slender and subulate. They reach to the anterior border of the 2nd chaetiger. The median tentacle is a little shorter. The stout tentacular cirri are inserted on the anterior border of the 1st segment.

The first three pairs of feet are much enlarged and carried forward beneath the body. In addition to a stout dorsal cirrus and a small conical ventral cirrus, there are a small papilla on the inner and anterior face of the chaetal lobe and two papillae, a ventral and a dorsal, at the apex of the chaetal lobe. Behind the first three modified chaetigers the feet are of the usual onuphid shape (Fig. 46, *a*). The dorsal cirrus is rather short and thick, just surpassing the end of the chaetal lobe. The ventral cirrus is a rounded lobe and it is transformed into a pad by the 6th chaetiger. The cirriform prolongation

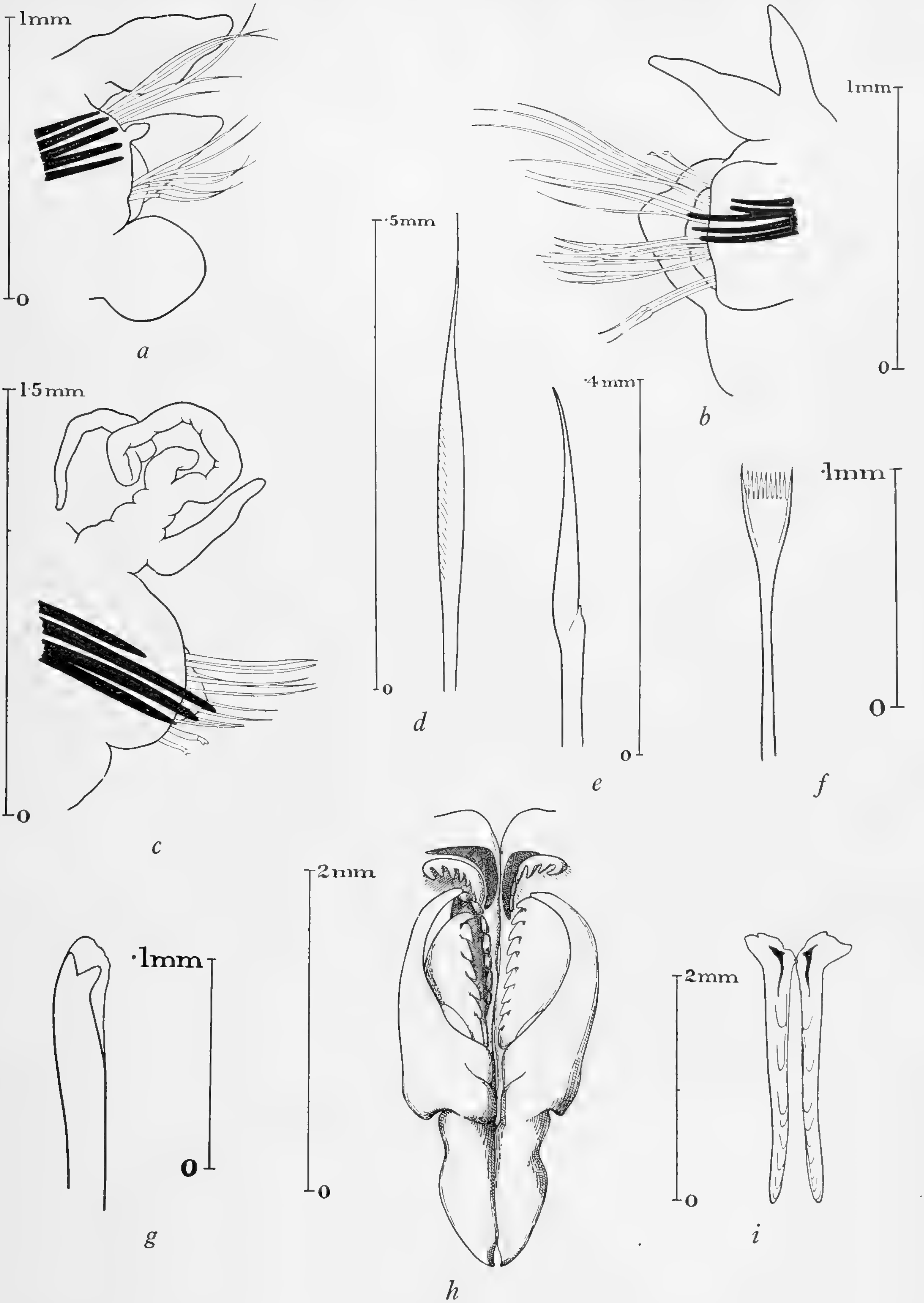


Fig. 46. *Rhamphobrachium ehlersi.*

a. Fourth foot. *b.* Eleventh foot. *c.* Twenty-second foot. *d.* Dorsal capillary bristle. *e.* Compound bristle. *f.* Comb chaeta. *g.* Subacicular hook. *h.* Upper jaws. *i.* Lower jaw plates.

of the posterior lip of the chaeta sac disappears by the 10th chaetiger. The gills begin as a single filament on the 10th–11th chaetiger (Fig. 46, *b*) and at the 20th are bifilamentous (Fig. 46, *c*). In the present specimens there are never more than two filaments. The fully developed gill is two or three times as long as the dorsal cirrus.

All the bristles of the first three modified chaetigers are broken off. The 4th foot contains a dorsal bundle of capillary bristles (Fig. 46, *d*) and a ventral bundle of compound bristles with knife-like blades (Fig. 46, *e*). There are three long pointed yellow acicula supporting the feet. At the 10th foot there are, in addition to the two types of bristles already described, two or three dorsally situated comb chaetae (Fig. 46, *f*). At about the 20th foot a pair of yellow hooded bidentate subacicular hooks (Fig. 46, *g*) appear and take the place of the compound bristles.

The dental formula is 7—9 : 9 + 6—6, and the details of the jaws are shown in the figure (Fig. 46, *h*). The anterior part of the lower jaws (Fig. 46, *i*) is calcareous.

REMARKS. There are three known species of this rare abyssal genus, *R. agassizi*, *R. brevibrachiata* and *R. chuni*. The present species is distinguished by the low number of filaments to the gills and the character of its bristles. Fauvel apparently does not accept the genus *Rhamphobrachium*, for he redescribes (1923, p. 417) the *Diopatra brevibrachiata*, Ehlers (1875, p. 49), under the generic name *Onuphis*. Ehlers (1908, p. 78) has himself recognised that this species falls within the genus *Rhamphobrachium*.

Genus **Onuphis**, Audouin and Milne-Edwards

Onuphis eremita, Audouin and Milne-Edwards.

Fauvel, 1923, p. 414, fig. 163 *a–l*.

St. 91. 8. ix. 26. ·5 mile off Roman Rock, False Bay, South Africa. 35 m. Gear **NRL**. Bottom: sand. One specimen.

REMARKS. A single specimen incomplete posteriorly and measuring 23 mm. by 2 mm. without the feet. There are 60 chaetigers. This specimen corresponds in detail with Fauvel's account.

There are branchiae on every foot. Up to the 22nd foot the branchiae are single: on the 23rd foot there are two filaments, which are continued to the end of the fragment.

That which Fauvel describes as a little conical tubercle between the chaetigerous lobe and the base of the dorsal cirrus is only present on the first three to four chaetigers. It appears to be a prolongation of the anterior lip of the chaeta sac. The ventral cirrus disappears by the 6th chaetiger and the cirriform prolongation of the posterior lip of the chaeta sac by the 10th.

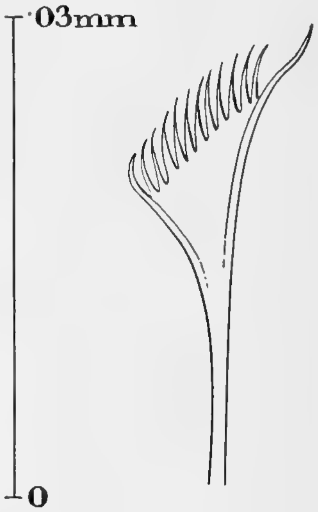


Fig. 47. *Onuphis eremita*. Comb chaeta.

The dental formula is as follows: 7—8 : 8 + 6—8. I figure a comb chaeta (Fig. 47).

Onuphis notialis, n.sp.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH.** Bottom: rock. One specimen.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH.** Bottom: rock. Five specimens.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH.** Bottom: mud, stones and gravel. Two specimens.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 315 m. Gear **DLH.** Bottom: mud and rock. Four specimens.

Description. The most complete specimen measures 35 mm. by 2 mm. and has 65 chaetigers. There are dark red segmental colour bands across the body and in two or three examples a longitudinal red stripe down the back. There is a pair of globular frontal tentacles. There are five occipital tentacles. The inner lateral occipital tentacles are the longest, reaching to the 7th chaetiger, and the median is slightly shorter. I can discover no eyes. The tentacular cirri are inserted on the anterior border of the buccal segment just behind the inner laterals. Up to about the 5th chaetiger the body is more cylindrical and the segments longer than in more posterior regions where the body is dorso-ventrally flattened

The first five feet have long cirriform postchaetal lips (Fig. 48, *a*), almost as long as the dorsal cirri: the postchaetal lips diminish in size from before backwards and finally disappear about the 16th chaetiger. In the middle and posterior regions of the body the dorsal cirrus just fails to reach the tips of the bristles. The digitiform ventral cirrus is absorbed into a pad by the 5th foot (Fig. 48, *b*). There are no branchiae.

The first five feet have hooded tridentate pseudo-compound bristles (Fig. 48, *c*) and delicately bordered capillaries. In some preparations one of the teeth of the pseudo-compound bristles is lost and they have a bidentate appearance. Behind the 5th foot the bristles consist of capillaries (Fig. 48, *d*) and comb chaetae (Fig. 48, *e*) with about 12 rather long teeth. At about the 15th chaetiger a pair of yellow bidentate hooded crochets (Fig. 48, *f*) appear. The feet are supported by two slender yellow acicula.

The details of the jaws (Fig. 48, *g* and *h*) are given in the figure: the dental formula is 7—9 : 7 + 8—10.

Remarks. I was much tempted to regard these specimens as young examples of *Onuphis abranchiata*, McIntosh (1885, p. 314), described by that author from Antarctic waters, but there are many points of difference between these specimens and those of McIntosh.

In McIntosh's type specimens the postchaetal lip of the 1st foot is thick and truncated; at the 2nd foot it is long and cirriform, slightly shorter than the dorsal cirrus; it diminishes in size from before backwards but appears to be continued to the end of the body. The ventral cirrus has become a pad by the 4th foot. The pseudo-compound chaetae are described as bidentate and not tridentate, as in these specimens. Moreover,

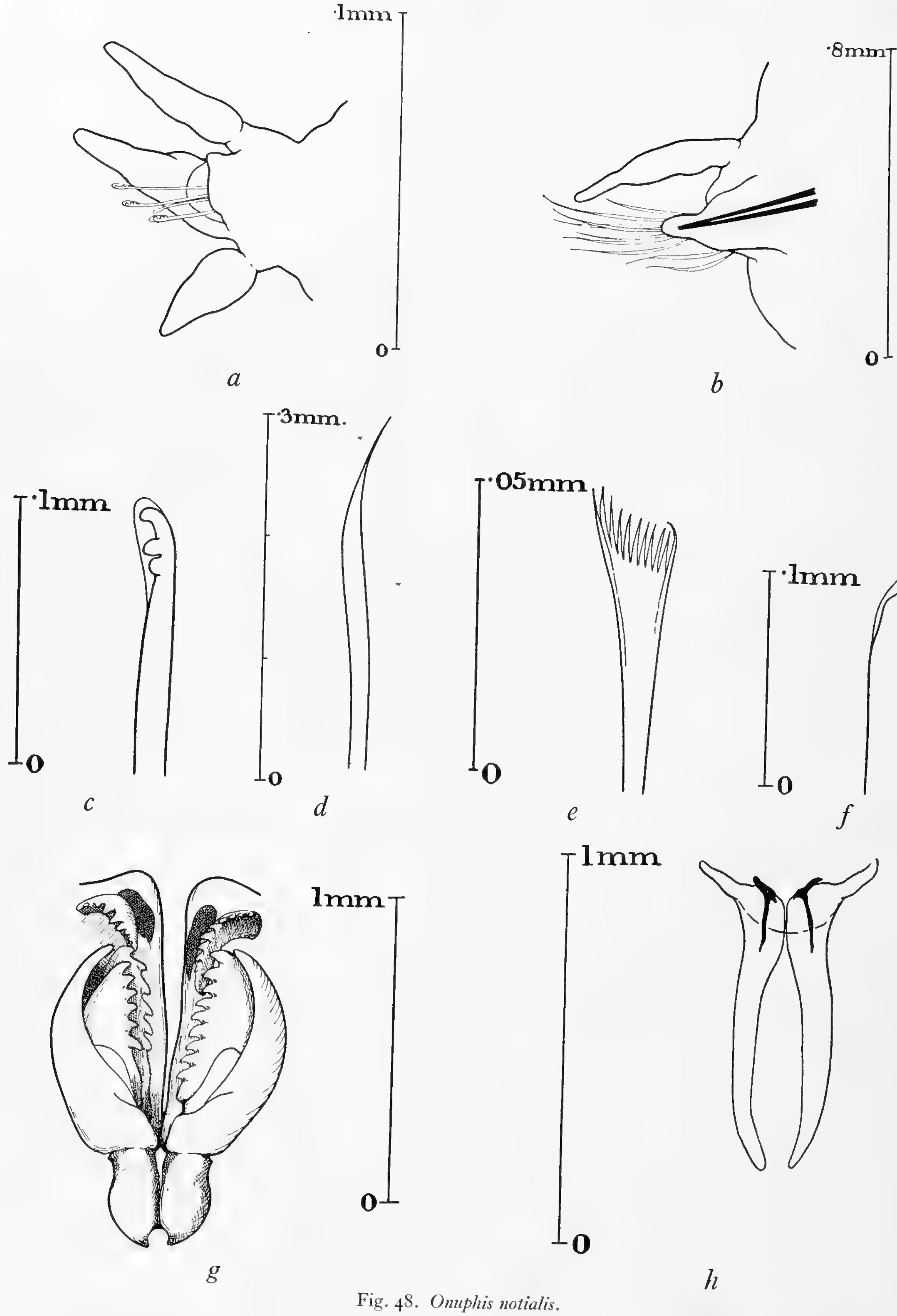


Fig. 48. *Onuphis notialis*.

a. Second foot. *b*. Tenth foot. *c*. Tridentate bristle from second foot. *d*. Capillary bristle from tenth foot. *e*. Comb chaeta. *f*. Hooded crochet. *g*. Upper jaws. *h*. Lower jaw plates.

the jaws, as figured by McIntosh, differ in many details of structure from those of the present specimens.

O. sombreriana (McIntosh), and *O. minuta* (McIntosh), are both abranchiate species but with bidentate pseudo-compound bristles.

Onuphis quadricuspis, M. Sars.

Fauvel, 1923, p. 418, fig. 165 *f–p*.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 115 m. Gear **DLH**. Bottom: fine sand. Three specimens.

St. WS 78. 13. iii. 27. 51° 01′ 00″ S, 68° 04′ 30″ W. From 51° 01′ 00″ S, 68° 02′ 00″ W to 51° 01′ 00″ S, 68° 07′ 00″ W. 95 m. Gear **DC**. Bottom: fine dark sand. Five specimens.

St. WS 95. 17. iv. 27. 48° 58′ 15″ S, 64° 45′ 00″ W. From 48° 57′ 00″ S, 64° 45′ 00″ W to 48° 59′ 30″ S, 64° 45′ 00″ W. 109 m. Gear **DC**. Bottom: fine dark sand, stones and shell. Two specimens.

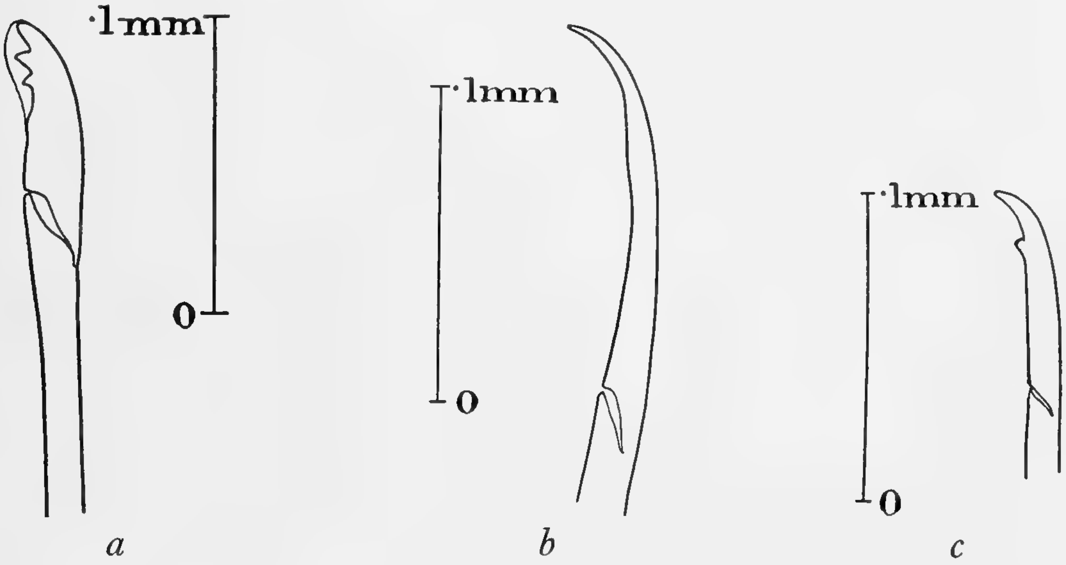


Fig. 49. *Onuphis quadricuspis*.

a. Tridentate pseudo-compound bristle. *b*. Smooth pseudo-compound bristle. *c*. Bidentate pseudo-compound bristle.

Remarks. All the examples are incomplete. The most perfect has about 40 chaetigers and measures 30 mm. by 2 mm. including the feet. In one specimen there are red transverse segmental bands across the back: they are either absent or very faint for the first six chaetigers. The first four to five chaetigers form a kind of neck: the segments are narrow and cylindrical and $1\frac{1}{2}$ times as long as a segment from the middle of the body. There are two short ovoid frontal tentacles. The inner laterals reach to the 3rd chaetiger and the outer laterals and the median are shorter than these. The buccal segment has a pair of short tentacular cirri inserted on its anterior border behind the inner laterals. The shape of the anterior segments is as usual in the genus. The ventral cirrus is converted into a pad by the 6th–7th chaetiger. The cirriform posterior lip of the chaeta sac disappears about the 17th foot. The fully developed branchia is longer than the

dorsal cirrus. The branchiae begin as a single filament on the 6th foot, are bifilamentous at the 7th and have three filaments at the 30th. The latter is the maximum number for these specimens.

The first five chaetigers have capillary bristles and pseudo-compound bristles: of these there are a few smaller and apparently unused examples which are hooded and clearly tridentate (Fig. 49, *a*), but the great majority are absolutely smooth and apparently without hoods (Fig. 49, *b*): a few have a single tooth below the apex (Fig. 49, *c*). These bristles are puzzling: I am inclined to regard them as old and worn examples of what were once hooded tridentate bristles. The comb chaetae have about 12 rather long narrow teeth. At about the 15th chaetiger a pair of bidentate hooded subacicular hooks appears. The feet are supported by three rather slender yellow pointed acicula.

The dental formula is as follows: 8—8 : 8 + 5—9: Fauvel's figure of the jaws (Fig. 165 *g*) differs in a number of details from that of McIntosh (1908, Pl. lxiv, fig. 2). The jaws of the present specimens correspond closely to McIntosh's figure.

Except in regard to certain of the anterior pseudo-compound bristles, already mentioned, these specimens correspond to the descriptions of this deep-water European species. Fauvel, however, states that it has no transverse colour bands: these are present in my specimens. It is noteworthy that McIntosh (1924, p. 36) has recorded the presence of this species at a depth of 47 fathoms off the Cape of Good Hope.

Onuphis iridescens (Johnson).

Northia iridescens, Johnson, 1901, p. 408, pl. viii, figs. 86–87; pl. ix, figs. 88–92.
Moore, 1911, p. 255.

St. 228. 2. v. 27. 53° 33′ 00″ S, 61° 49′ 30″ W. 650 m. Gear **N 70 V**. ? Net touched bottom. Bottom: diatomic ooze. Two specimens.

REMARKS. One complete specimen and a second incomplete posteriorly. The complete specimen measures 72 mm. by 1 mm. without the feet. The colour in spirit is a pearly iridescent white. There are no eyes. There is a pair of globular frontal tentacles, and the occipital tentacles have long ringed tentaculophores. The inner pair is the longest, reaching to the 8th chaetiger, and the outer are about half their length. The median reaches to the 4th chaetiger. The tentacular cirri are long and filiform.

Johnson's figure of the 2nd foot of *O. elegans* (Johnson, *loc. cit.* Pl. viii, fig. 80) is exactly similar to that of this species. The long postchaetal processes are reduced to small papillae by the 12th foot. The ventral cirrus begins to be absorbed by the 6th foot. From about the 15th to the 25th foot the cirriform gill and dorsal cirrus are of approximately the same length. Further back the cirrus becomes increasingly shorter than the gill.

In the complete specimen the gills begin on the 1st chaetiger and are continued to about the 40th segment from the end of the body. The gills are slender, cirriform and unifilamentous throughout.

The pygidium carries two pairs of styles, one about half the length of the other. A pair of hooded bidentate subchaetal spines appear at about the 15th foot.

The jaws are small and rather delicate. The carriers taper down to two fine points: the dental formula is 8—8 : 9 + 5—7.

In the same bottle with the specimens are three worm tubes: they have a very narrow lumen and are made of a soft membraneous substance thickly coated with green mud.

My specimens from off Cape Horn seem to correspond with Johnson's description of his examples dredged at Victoria, British Columbia. The body measurements are, however, different. Johnson gives 38 mm. by 3 mm. for 52 somites; my complete specimen measures 72 mm. by 1 mm. without the feet for 170 segments.

Onuphis elegans (Johnson), from an unknown locality, is very close to and perhaps identical with this species. Chamberlin (1919, p. 295) separates them on the ground of certain differences in the number of teeth in the jaw plates and in the shape of the teeth of the pseudo-compound bristles, both of which characters are within certain limits matters of individual variation.

Eyes are present in *O. elegans* and absent in this species: this is, however, not always a satisfactory specific character (v. Ehlers, 1887, p. 80). *Onuphis holobranchiata*, Marenzeller, is also a closely allied species. This species also has eyes, the carriers of the jaws are rounded at the ends and not pointed as in *O. iridescens* and the shape of the teeth of the pseudo-compound bristles is different.

Onuphis pallida (Moore) (1911, p. 256) has the gill beginning on the 4th chaetiger, and corresponds with my incomplete specimen in which the arrangement of the gills is similar. It is probably identical with *O. iridescens*.

Genus **Leptoecia**, Chamberlin

Leptoecia antarctica, n.sp.

St. 177. 5. iii. 27. 27 miles SW of Deception Island, South Shetlands. 63° 17′ 30″ S, 61° 17′ 00″ W. 1080 m. Gear **DLH**. Bottom: mud and stones. Sixty specimens.

Description. Ten specimens and about 50 tubes with an average length of 60 mm. and a diameter of 2 mm. The tubes have stout and very resistant walls of mud, from which it is difficult to extract the animal. The ten specimens free of their tubes must have been removed from them by the collector probably while the animal was alive. Most of the tubes contain a specimen.

The largest specimen examined has 56 chaetigers and measures 33 mm. by 2 mm. including the feet. The body is slender and flattened and in spirit there are no colour markings. There are two globular palps, two ovoid anterior tentacles and five occipital tentacles with short ringed ceratophores. The inner lateral tentacles reach back to the 6th chaetiger; the median tentacle is about half their length and the outer laterals about one-third. I can find no trace of eyes. The buccal segment is longer than the prostomium and about equal in length to the following segment. It is not surpassed by the 1st foot. There are no tentacular cirri and no branchiae.

The first three chaetigers (Fig. 50, *a*) have a cirriform posterior lip to the pedal lobe and a tapering ventral cirrus, both of which decrease in size rapidly from before back-

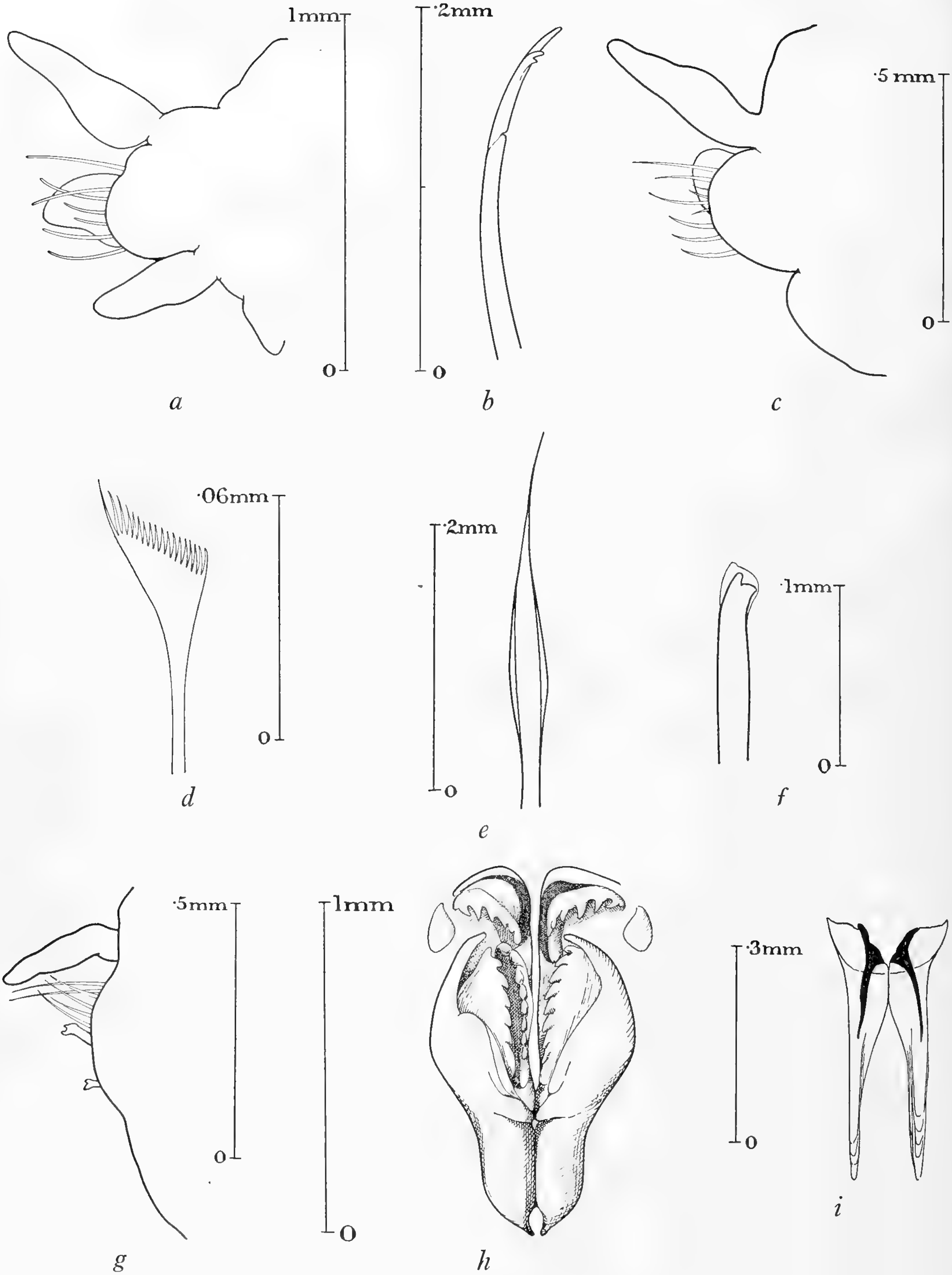


Fig. 50. *Leptoecia antarctica.*

a. First foot. *b.* Bidentate pseudo-compound bristle. *c.* Fourth foot. *d.* Comb chaeta. *e.* Capillary bristle of middle foot. *f.* Bidentate hook. *g.* Thirtieth foot. *h.* Upper jaws. *i.* Lower jaw plates.

wards. The dorsal cirrus also grows increasingly shorter till about the 7th foot, where it is a digitiform process reaching to the tips of the bristles. It retains this form throughout the rest of the body. Behind the 3rd foot the ventral cirrus is modified into a glandular pad.

The 1st foot has a few simple capillary bristles and a number of curved hooded bidentate crochets (Fig. 50, *b*) with a feeble pseudo-articulation. These are continued to the 4th chaetiger (Fig. 50, *c*) in which a single broadly bilimbate capillary bristle also occurs. The 5th foot has bilimbate capillary bristles only.

At the 10th foot there is a small dorsal group of comb chaetae (Fig. 50, *d*) with numerous short closely set teeth, a number of the usual twisted bilimbate capillaries (Fig. 50, *e*) with slender tips, and a pair of yellow hooded bidentate hooks (Fig. 50, *f* and *g*). In the posterior feet the comb chaetae seem to be absent and the capillary bristles are narrower.

The dental formula is as follows: 7—7 : 9 + 5—8 (Fig. 50, *h*). The teeth and the junction of the carriers are dark brown, but the plates are pale yellow. The under jaws (Fig. 50, *i*) are delicate translucent structures, except for a pair of dark chitinous pieces at the anterior end.

REMARKS. Chamberlin established the genus *Leptoecia* to include forms resembling *Hyalinoecia* but without gills.

The present species is near to *Leptoecia abyssorum*, Chamberlin (1919, p. 320), collected at a depth of 2005 fathoms between the Galapagos and Peru. It differs from Chamberlin's species in that the curved anterior crochets are continued to the 4th chaetiger and are feebly pseudo-compound: in *L. abyssorum* they are unjointed and confined to the 1st foot. Moreover, the number of teeth in the jaws is higher in Chamberlin's species. The only records of this genus are the present one and that of Chamberlin. It appears to be abyssal.

Sub-family *LUMBRICONEREINAE*, Grube

Genus **Lumbrinereis**, Blainville

Lumbrinereis magalhaensis, Kinberg.

Gravier, 1911, p. 78, pl. iii, figs. 35–36, with synonymy.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Eighteen specimens.

St. 29. 16. iii. 26. West Cumberland Bay, South Georgia. 5·9 miles S 51° W of Jason Light. 23 m. Gear **DC**. Bottom: mud and stones. One specimen.

St. 30. 16. iii. 26. West Cumberland Bay, South Georgia. 2·8 miles S 24° W of Jason Light. 251 m. Gear **DLH**. Bottom: mud and stones. One specimen.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **OTL**. Bottom: grey mud. Two specimens.

St. 42. 1. iv. 26. Off mouth of Cumberland Bay, South Georgia. From 6·3 miles N 89° E of Jason Light to 4 miles N 39° E of Jason Light. 120–204 m. Gear **OTL**. Bottom: mud. Two specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. 34 specimens. Gear **NCS–T**. One specimen.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 115 m. Gear **DLH**. Bottom: fine sand. Four specimens.

St. 123. 15. xii. 26. Off mouth of Cumberland Bay, South Georgia. From 4·1 miles N 54° E of Larsen Point to 1·2 miles S 62° W of Merton Rock. 230–250 m. Gear **OTL**. Bottom: grey mud. Three specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **N 4–T**. Bottom: green mud and stones. Four specimens. Gear **OTL**. Two specimens.

St. 141. 29. xii. 26. East Cumberland Bay, South Georgia. 200 yards from shore, under Mount Duse. 17–27 m. Gear **BTS**. One specimen.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **OTL**. Bottom: green mud and sand. Twenty-five specimens.

St. 145. 7. i. 27. Stromness Harbour, South Georgia. Between Grass Island and Tonsberg Point. 26–35 m. Gear **BTS**. One specimen.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH**. Bottom: rock. One specimen.

St. 159. 21. i. 27. 53° 52′ 30″ S, 36° 08′ 00″ W. 160 m. Gear **DLH**. Bottom: rock. One specimen.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. One specimen.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 391 m. Gear **OTM**. Bottom: mud and stones. Three specimens.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear **BTS**. Bottom: mud and sand. One specimen.

St. WS 65. 22. i. 27. Undine Harbour (North), South Georgia. Shore collection, from kelp root. Two specimens.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S $\frac{1}{2}$ E to $8\frac{1}{2}$ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. Twenty specimens.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. $9\frac{1}{4}$ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **BTS**. One specimen.

REMARKS. This species is very common round South Georgia, but I have only a single record of it from the Falkland Islands. It appears to show very little variation and is distinguishable easily from *L. tetraura*, to which it has a great superficial resemblance, by the presence of only a single tooth at the apex of M. III, whereas in *L. tetraura* there is a pair of teeth at the apex of M. III. I agree with Benham's suggestion that *L. kerguelensis*, McIntosh, is identical with Kinberg's species.

Lumbrinereis africana, Augener.

Augener, 1918, p. 367, pl. vii, figs. 261 and 262, text-fig. 42.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo. From 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. 58–67 m. Gear **OTL**. Bottom: mud and fine sand. Four specimens.

REMARKS. Four thread-like specimens measuring 1 mm. across the body and superficially very like the examples of *Drilonereis filum* with which they were associated. They are close to *L. impatiens*, Claparède. The prostomium is conical, simple crochets are present in the 1st chaetiger and the acicula are yellow. The change in the form of the simple crochets from the anterior and the posterior segments is well illustrated by Augener. The jaws are similar to those of *L. impatiens*, except that I cannot discover more than a single tooth in M. III.

Lumbrinereis coccinea, Renieri.

Fauvel, 1923, p. 432, fig. 172 *g–n*.
Crossland, 1924, p. 32.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. Two specimens.

REMARKS. Two small specimens measuring only 1·5 mm. across the body. The presence of a globular prostomium, compound crochets in the anterior feet, yellow acicula, and jaws that resemble Fauvel's figure *h* would seem to refer them to this species.

Lumbrinereis heteropoda, Marenzeller.

Crossland, 1924, p. 4, text-figs. 1–7, with synonymy.

St. 4. 30. i. 26. Tristan da Cunha. 36° 55′ 00″ S, 12° 12′ 00″ W. 40–46 m. Net **DL**. Bottom: stones. Three specimens.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo. From 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. 58–67 m. Gear **OTL**. Bottom: mud and fine sand. Two specimens.

REMARKS. Five fragmentary examples of great size, the largest measuring 7 mm. across the body. This species is easily identifiable by the great elongation of the posterior lip of the foot in the hinder segments. The *L. branchiata* of Treadwell from the West Indies is an allied species, but the long and slender "carriers" of the jaws are very different from those of this species.

Lumbrinereis tetraura (Schmarda).

Ehlers, 1901, p. 137, pl. xvii, figs. 1–10.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. One specimen.

St. 57. 16. v. 26. Port William, East Falkland Island. 5½ cables S 20° W of Sparrow Point. 15 m. Gear **BTS**. Two specimens.

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa. Basin of H.M. Dockyard. 0–2 m. Gear **NH**. Twelve specimens.

St. WS 84. 24. iii. 27. 7½ miles S 9° W of Sea Lion Island, East Falkland Island. From 52° 33′ 00″ S, 59° 08′ 00″ W to 52° 34′ 30″ S, 59° 11′ 00″ W. 75–74 m. Gear **OTC**. Bottom: coarse sand, shell and stones. Two specimens.

REMARKS. Both McIntosh and Ehlers have recorded this species from Simon's Town.

Lumbrinereis antarctica, n.sp.

St. 182. 14. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 21′ 00″ S, 62° 58′ 00″ W. 278–500 m. Gear N 7–T. Bottom: mud. One specimen.

DESCRIPTION. The specimen from St. 182 is incomplete posteriorly and measures 34 mm. by 2 mm. without the feet for 80 chaetigers. The body is not tapered at the ends.

The prostomium (Fig. 51, *a*) is equal in length to the first four segments and is rather sharply pointed. On the underside the usual pair of buccal cushions is present, and the second segment appears to be prolonged to form the lower lip of the mouth, but this is not very clear in the specimen. The first segment is very slightly longer than the second.

The feet (Fig. 51, *b*, *c* and *d*) increase rather rapidly in size up to the 6th chaetiger. The anterior lip of the pedal lobe is rounded and not at all prominent, and the posterior lip in the front part of the body forms a slender digitiform process: further back it becomes gradually smaller until towards the end of the fragment it is reduced to a small papilla.

The bristles present a remarkable appearance because the lower part of their shafts is black and the upper part yellow. The feet are supported by two black acicula. As far as about the 10th foot the bristles are limbate capillaries (Fig. 51, *e*); further back a number of simple crochets (Fig. 51, *f*) with long flanges appears. Towards the hinder end of the fragment the flanges of the simple crochets become shorter. The limbate capillaries are replaced by simple capillaries.

The mandible (Fig. 51, *g*) is a light and delicate structure, the details of which are given in the figure.

Of the upper jaws (Fig. 51, *h*) M. I is a pair of simple pincers. M. II has three large teeth. M. III is a slender triangular plate with a single tooth. M. IV is a very large single-toothed triangular plate.

REMARKS. This species is characterised by the very small digitiform posterior lip of the foot, by the half black, half yellow bristles and the arrangement of M. III and M. IV. It is allied to the European *L. fragilis* (O. F. Müller), but distinguished by the character of the feet and the more anterior position of the simple crochets.

Genus **Augeneria**[1], gen. nov.

DIAGNOSIS. As *Lumbrinereis*, but with three small tentacles on the hinder edge of the prostomium and partly hidden in a crescentic groove between the prostomium and buccal segment, as in *Halla*.

[1] This genus is named after Dr H. Augener of Hamburg, the author of many valuable contributions to our knowledge of the Polychaeta.

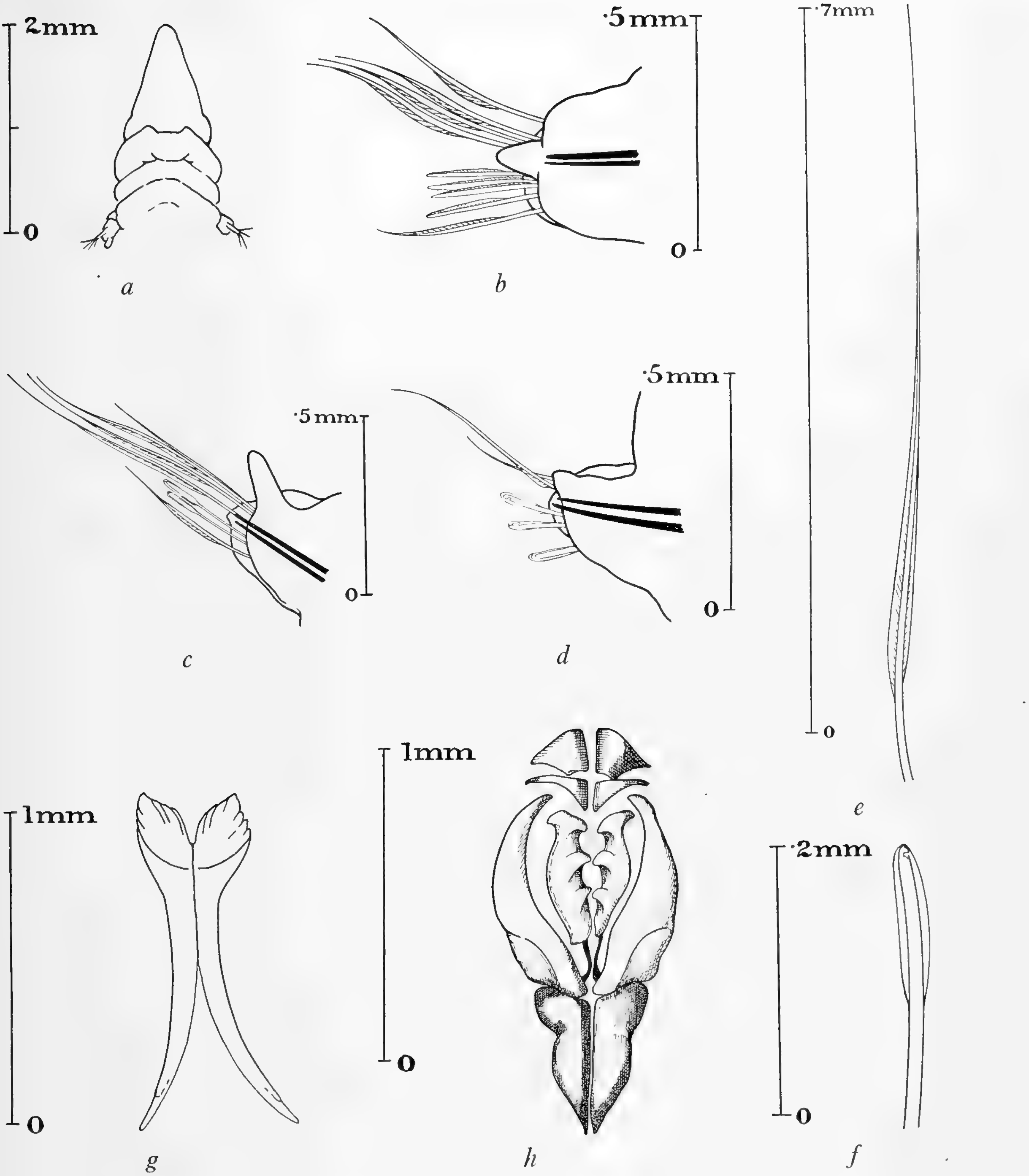


Fig. 51. *Lumbrinereis antarctica.*

a. Head from above. *b.* Tenth foot. *c.* Twenty-fifth foot. *d.* Sixtieth foot. *e.* Bordered capillary bristle. *f.* Crochet. *g.* Lower jaw plates. *h.* Upper jaws.

Augeneria tentaculata, n.sp.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. Fourteen specimens.

St. 187. 18. iii. 27. Neumayr Channel, Palmer Archipelago. 64° 48′ 30″ S, 63° 31′ 30″ W. 259 m. Gear **DLH**. Bottom: mud. One specimen.

Description. The great majority of the specimens are incomplete posteriorly. The largest complete specimen measures 135 mm. by 3 mm. without the feet and has about 110 chaetigers.

All colour has disappeared from most of the specimens, but traces of a thin transverse colour band joining the bases of the feet remain in a few. When present, this does not begin before the 6th chaetiger. The body is of the usual "*Lumbrinereis*" shape, cylindrical in front and more flattened posteriorly: it does not taper at the ends.

The prostomium (Fig. 52, *a*) is of a rounded oval form without a trace of eyes. The three small subequal tentacles situated at the hinder edge of the prostomium are sometimes almost hidden in a groove where a crescentic re-entrant is carved out of the anterior border of the first segment. In this groove the evaginable nuchal organs are also situated. On the undersurface of the prostomium (Fig. 52, *b*) is a pair of large buccal cushions. The second segment is carried forward to form the lower border of the mouth in a manner similar to that in *Lumbrinereis magalhaensis*.

The 1st segment is about half as long again as the 2nd. The first two segments are achaetous. For the first five chaetigers the feet gradually increase in length. The anterior lip of the chaetal lobe is rounded and does not project, the posterior lip forms a conical process. There are no pedal cirri nor branchiae.

The anterior feet (Fig. 52, *c*) carry compound crochets and bordered capillaries (Fig. 52, *d*). In the compound crochets (Fig. 52, *e*) the end-piece or blade is rather short, its length being less than the length of the continuation of the cutting flange below the joint. At the apex of the blade there are about four teeth above the main fang.

In the middle feet compound crochets are replaced by simple crochets (Fig. 52, *f*) with four to five teeth, and the capillaries have narrower borders and long and extremely delicate ends. In each foot the most dorsal bristle is a single giant simple crochet (Fig. 52, *g*), of the same form as, but larger than the rest of, the crochets in the foot. In the posterior feet (Fig. 52, *h*) the postchaetal lobe becomes more pointed, and the bordered capillaries are replaced by simple capillaries. About the last 20 feet have simple crochets only.

I can see no acicula.

The lower jaw (Fig. 52, *i*) is rather short, longitudinally striated, and with small calcareous end-pieces. Regarding the maxillae (Fig. 52, *k*), M. I is a pair of simple black pincers. M. II is a pair of heavy plates with three teeth. M. III has two teeth. M. IV is a pair of large subrectangular plates without any clearly defined teeth. The carriers are narrow and pointed.

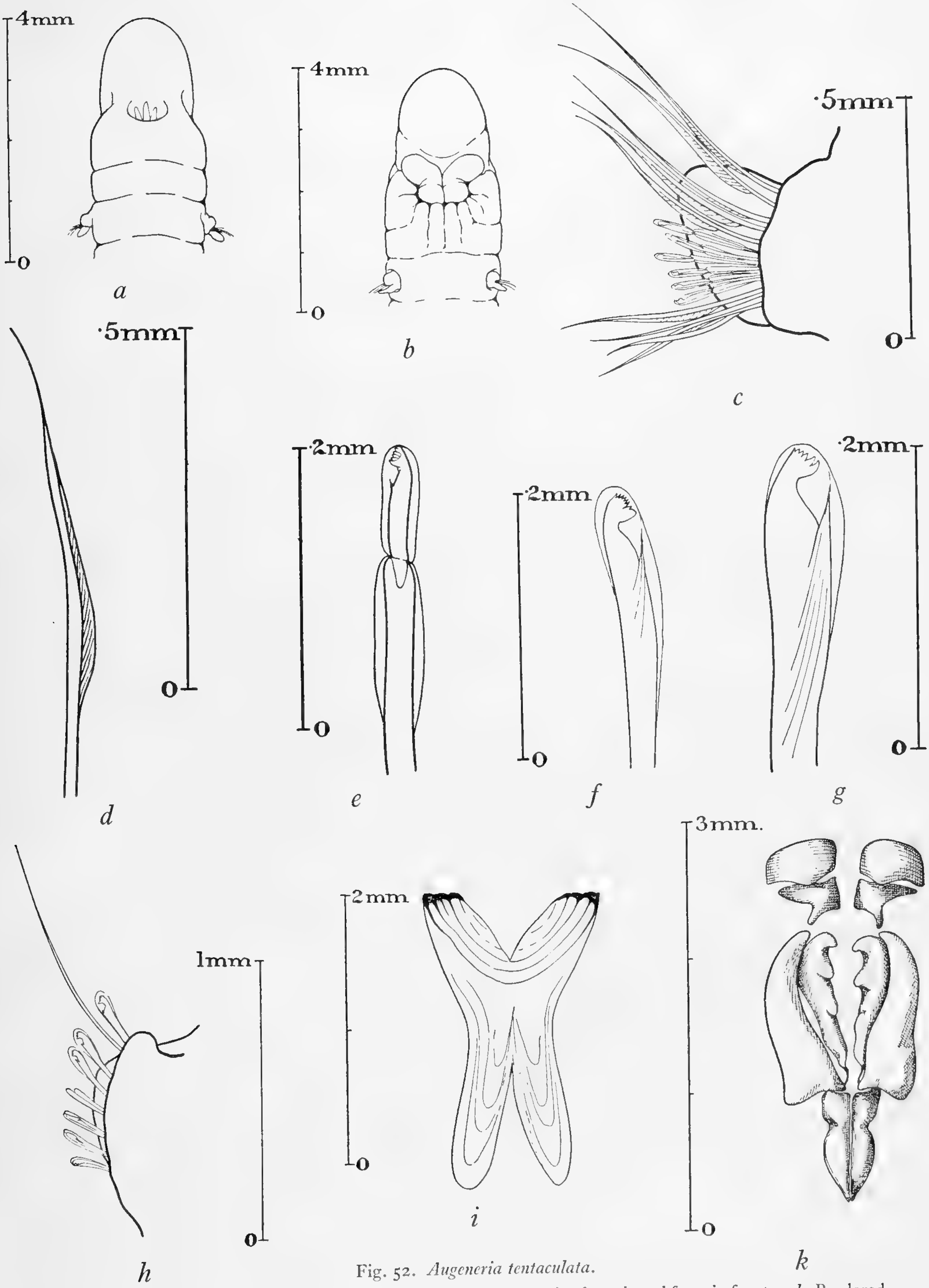


Fig. 52. *Augeneria tentaculata.*

a. Head seen from above. *b.* Head seen from below. *c.* Anterior foot viewed from in front. *d.* Bordered capillary bristle. *e.* Compound crochet. *f.* Simple crochet. *g.* Giant crochet. *h.* Posterior foot viewed from behind. *i.* Lower jaw plates. *k.* Upper jaws.

Remarks. Except for the three tentacles this form is a typical *Lumbrinereis*; but the presence of these structures places it outside the sub-family *Lumbrinereinae*, in which, however, I propose to leave it provisionally rather than create another sub-family. It may possibly be a link between the *Lysaretinae* and the *Lumbrinereinae*, but in its general characteristics it is closer to the latter family than to the former.

Genus **Arabella**, Grube

Arabella iricolor (Montagu).

Fauvel, 1923, p. 438, fig. 175 *a–h*, with synonymy.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. Four specimens.

Remarks. The *Arabella lorum*, described by Ehlers (1897, p. 78) from off the Patagonian coast, is easily distinguished from *A. iricolor* by the presence of toothed plates in M. I instead of pincers with toothed bases. *A. caerulea* (Schmarda), described by Ehlers from off the coast of Chile, is near to this species, but the under jaws have a very different shape.

Genus **Drilonereis**, Claparède

Drilonereis filum (Claparède).

Fauvel, 1923, p. 436, fig. 174 *a–h*.
Drilonereis longa, Webster, Augener, 1918, p. 375.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo. From 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. 58–67 m. Gear **OTL**. Bottom: mud and fine sand. Four specimens.

Remarks. Crossland has described two species, *D. major* and *D. logani*, from the east coast of Africa and Suez, both of which differ from this species in the small jaw plates.

Drilonereis sp.

St. 4. 30. i. 26. Tristan da Cunha. 36° 55′ 00″ S, 12° 12′ 00″ W. 40–46 m. Gear **DL**. Bottom: stones. Two specimens.

Description. The colour in spirit is dark red and the skin is iridescent. About the first 20 segments are pale in contrast with the rest of the body. The specimens are both incomplete and the larger measures about 400 mm. by 3 mm. without the feet. The prostomium is rather flattened, bluntly conical and without eyes. It is equal in length to the first two segments.

The feet are moderately well developed from the 1st chaetiger, but show a very gradual increase in size up to about the 25th foot. From the 1st foot they consist of a rounded anterior lobe and a longer conical posterior lobe. There is nothing diagnostic about the bristles. There are a number of curved bilimbate capillary bristles, several acicula ending in a fine capillary tip, and a large bluntly pointed ventral aciculum.

Regarding the jaws (Fig. 53), in one of the specimens they are imperfectly developed: they are of a very pale yellow colour and incompletely chitinised. In the other specimen,

which I believe to be of the same species, they are fully developed. There is the usual pair of long slender black carriers. M. I is a pair of simple pincers. M. II has five teeth. M. III is small and has a large tooth with a very small and easily overlooked second tooth below it. M. IV is also small and unidentate. Behind the "carriers" is a large roughly cordiform plate which I believe to be a support of the "carrier," and not a lower jaw plate. I could discover no lower jaw plates.

REMARKS. I cannot with certainty attribute these two specimens to any known species, and I do not, with the material at my disposal, feel justified in establishing a new species. They are very close to and perhaps conspecific with *Drilonereis pinnata*, Treadwell (1921, p. 110) from the West Indies. Treadwell's species has eyes and differs also in certain details of the jaws.

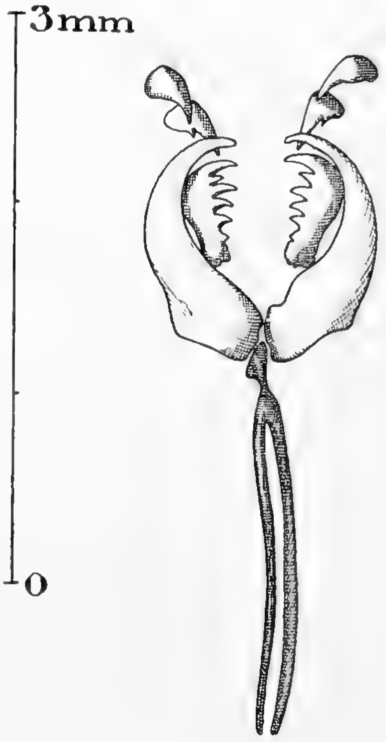


Fig. 53. *Drilonereis*, sp. Jaws.

Sub-family *STAUROCEPHALINAE*, Kinberg

Genus **Staurocephalus**, Grube

Staurocephalus neglectus, Fauvel.

Fauvel, 1923, p. 447, fig. 179 *i–q*.

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa. Basin of H.M. Dockyard. 0–2 m. Gear **NH**. One specimen.

REMARKS. A single specimen measuring 12 mm. by 2 mm. without the feet. It corresponds exactly to Fauvel's account except that at the posterior border of the prostomium is a couple of very faint minute dots which may represent a second pair of eyes. As Fauvel points out, this species is distinguished from *S. rudolphii* only by the absence of geniculate bristles from the first two chaetigers.

This species is quite distinct from the *S. egena* (Ehlers), also from Simon's Town.

Staurocephalus rubrovittatus, Grube.

Fauvel, 1923, p. 445, fig. 177 *a–l*.
Stauronereis rubrovittata, Augener, 1918, p. 376.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. One specimen.

REMARKS. A single colourless example of this species. It is characterised by the presence of capillary bristles only in the notopodium and by the long hair-like prolongation of the supports of a number of its jaw plates in the middle of the row.

Family ARICIIDAE, Savigny

Genus **Aricia**, Savigny

Aricia marginata, Ehlers.

Ehlers, 1897, p. 95, pl. vi, figs. 150–156.
Benham, 1921, p. 77.
Nainereis marginata, Fauvel, 1916, p. 445, pl. viii, figs. 26–33, with synonymy.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Seventy specimens.

St. 141. 29. xii. 26. East Cumberland Bay, South Georgia. 200 yards from shore, under Mount Duse. 17–27 m. Gear **BTS**. Bottom: mud. Fourteen specimens.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **N 4–T**. Bottom: green mud and sand. One specimen.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear **BTS**. Bottom: mud and sand. Nine specimens.

St. WS 62. 19. i. 27. Wilson Harbour, South Georgia. 26–83 m. Gear **BTS**. Five specimens.

St. MS ? 24 or 25. 13. iv. 25. East Cumberland Bay, South Georgia. (No further information.) Fourteen specimens.

REMARKS. I have examined a large series of examples of this species, which is common off South Georgia. The number of thoracic chaetigers varies between 11 and 14, but the greater part have 13 thoracic chaetigers.

The appearance of the gills on the 6th chaetiger is an almost constant character: in one specimen examined they begin on the 9th chaetiger. The three rows of spines in the ventral rami of the thoracic feet are also constant in my specimens. I find no capillary bristles in the ventral thoracic rami. Forked bristles are present in the abdominal region.

Aricia ohlini, Ehlers, with its 19 or 20 thoracic segments, is a very closely allied species.

Aricia michaelseni, Ehlers.

Ehlers, 1897, p. 88, pl. vi, figs. 136–140.

St. 56 ?. 16. v. 26. Sparrow Cove, Port William, East Falkland Island. 1 m. Gear **RM**. One specimen.

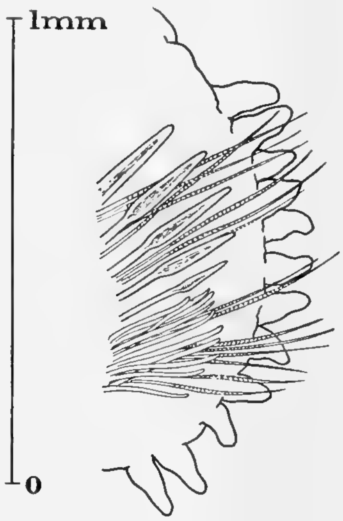


Fig. 54. *Aricia michaelseni*. Fifteenth thoracic foot.

REMARKS. A single specimen measuring 65 mm. by 2 mm. and incomplete posteriorly. There are 22 thoracic segments and the gills begin on the 6th chaetiger. Ehlers gives 17 to 19 thoracic segments and the 5th for the gills. There are about 12 papillae on a mid-thoracic foot. The ventral papillae begin on the 14th chaetiger and continue to the 23rd. The rows are single and contain a maximum of about 15 papillae. At the 14th chaetiger a great change comes over the thoracic neuropodia (Fig. 54). Four or five spear-headed chaetae appear, arranged in a transverse row,

and the thoracic crochets are confined to the ventral part of the ramus. The arrangement is well shown in Ehlers' fig. 137, except that he does not indicate the ordinary crochets at the base of the ramus and, moreover, in my specimens there is no single spear-headed bristle projecting clear of the body at the dorsal apex of the ramus.

The abdominal region has an intermediate cirrus and two acicula in the dorsal ramus and one in the ventral. Forked bristles are present.

I believe the arrangement of the spear-headed bristles to be characteristic of this species.

Genus **Nainereis**, Blainville

Nainereis hexaphyllum (Schmarda).

Theodisca (*Anthostoma*) *hexaphyllum*, McIntosh, 1905, p. 63, pl. v, figs. 27–29.
Scoloplos (*Naidonereis*) *hexaphyllum*, Augener, 1918, p. 421, pl. vi, figs. 153–154; pl. vii, fig. 260, text-fig. 59.

Saldanha Bay, South Africa, 1926. Beach Collection. Two specimens.

REMARKS. Two young specimens, the largest measuring 11 mm. by 2 mm.

Genus **Scoloplos**, Oersted

Scoloplos mawsoni, Benham.

Benham, 1921, p. 78, pl. ix, figs. 91–94.
Scoloplos kerguelensis, Gravier, 1911, p. 108, pl. v, figs. 60–63.
Non-*Scoloplos kerguelensis*, McIntosh, 1885, p. 355, pl. xxii A, fig. 19, pl. xliii, figs. 6–8.

St. 29. 16. iii. 26. West Cumberland Bay, South Georgia. 5·9 miles S 51° W of Jason Light. 23 m. Gear **DC**. Bottom: mud and stones. Eight specimens.

St. WS 32. 21. xii. 26. Mouth of Drygalski Fiord, South Georgia. 225 m. Gear **BTS**. Bottom: grey mud. Three specimens.

REMARKS. The average size is about 20 mm. by ·5 mm. These specimens agree with the accounts given by Gravier and Benham. In the posterior segments there are filiform cirri as in *S. armiger*.

Benham, who has had a very large number of specimens for examination, claims that this form is separate from the *S. kerguelensis* of McIntosh, Fauvel and others. I have not sufficient material to form an opinion of my own. Fauvel has recently (1927, p. 21) made *S. kerguelensis*, McIntosh, a synonym of *S. armiger*. If Benham and Fauvel are both right, there are two Antarctic species of *Scoloplos* known, *S. mawsoni* and *S. armiger*.

Scoloplos armiger (O. F. Müller).

Fauvel, 1927, p. 20, fig. 6 *k–q*.

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa. Basin of H.M. Dockyard. 0–2 m. Gear **NH**. One specimen.

Family SPIONIDAE

Genus **Pygospio**, Claparède

Pygospio dubia, n.sp.

St. 29. 16. iii. 26. West Cumberland Bay, South Georgia. 5·9 miles S 51° W of Jason Light. 23 m. Gear DC. Bottom: mud and stones. About fifty specimens.

DESCRIPTION. The average size is about 10 mm. by 1 mm. at the widest part. The body is tapered at both ends, the widest part being at about the 7th chaetiger. All colour has disappeared in spirit. The prostomium (Fig. 55, *a*) is subtriangular. In front it is very slightly indented in the middle, and the corners are prolonged into small rounded eminences: there are no frontal horns. It is continued back to the edge of the 2nd chaetiger and ends in a minute occipital tentacle. There is a pair of very long grooved palps, in some examples more than half the length of the body. I can see no trace of eyes.

In the anterior segments the lamellae are semi-oval and equally developed. The 1st chaetiger has fully developed dorsal and ventral rami but no gill. On the 2nd and 3rd chaetigers (Fig. 55, *b*) there is a finger-shaped gill quite separate from the dorsal lamella. The 4th and 5th chaetigers (Fig. 55, *c*) have no gill, but from the 7th to the 13th chaetiger (Fig. 55, *d*) there are gills more than twice the size of those of the 2nd and 3rd chaetigers and fused with the dorsal lamellae, except at the tip which is free.

In the posterior segments (Fig. 55, *e*) the lamellae are equally developed, the dorsal being broadly lanceolate and the ventral more papilliform. They are both small. There are capillary bristles (Fig. 55, *f*) bordered very slightly, if at all, in the dorsal and ventral rami. Between the 17th and 20th chaetigers, hooks (Fig. 55, *g*) appear in the ventral rami. These seem to be perfectly plain hooks lacking both a second tooth and a hood.

The pygidium is very puzzling. In some examples, apparently complete posteriorly, the body tapers simply to a point with an anus without anal cirri (Fig. 55, *h*); and in others there is a distinct pygidial sucker consisting of two vertical valves, which under the microscope have the appearance of oyster shells (Fig. 55, *i*). There are no neuropodial glandular pockets and I can discover no sexual pouches. The state of preservation was inadequate for an examination of the dorsal organs.

REMARKS. This is a young form. The presence of an occipital tentacle, or at any rate a minute process at the base of the tapered prostomium, of an anal sucker, of hooks in the ventral rami only, of gills beginning on the 2nd chaetiger and continuing fused with the dorsal lamellae from the 6th to the 13th chaetiger only, and the absence of frontal cornua and a modified 5th chaetiger place this form nearer to *Pygospio* than to any other genus. Moreover, the interrupted arrangement of the gills recalls that in the male of *P. elegans*.

My specimens are immature, and as far as I can discover they show no sexual dimorphism. They may, however, be the young of a *Polydora* in which the 5th chaetiger is not yet modified.

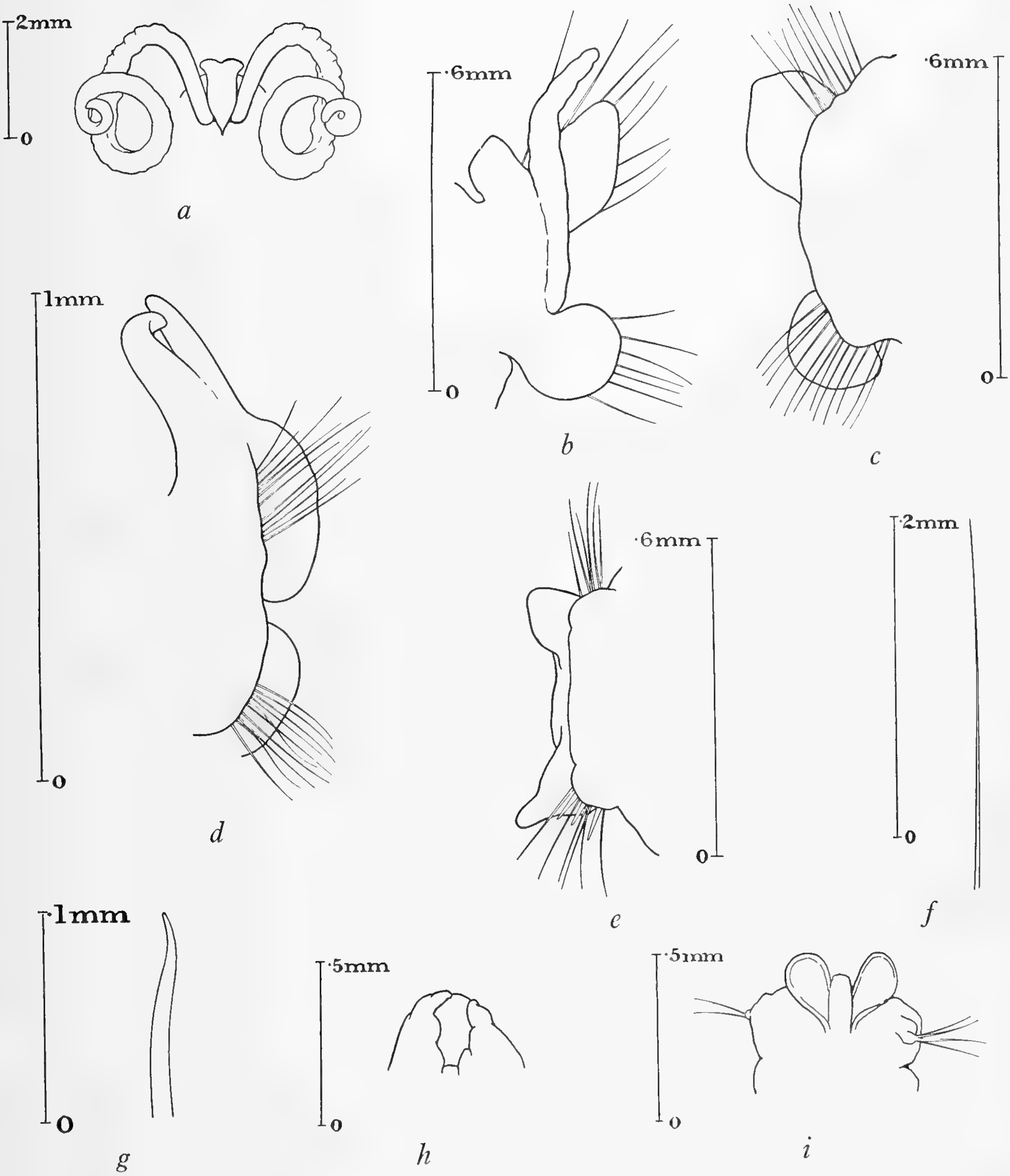


Fig. 55. *Pygospio dubia.*

a. Head. *b.* Third foot. *c.* Fifth foot. *d.* Tenth foot. *e.* Posterior foot. *f.* Capillary bristle. *g.* Ventral hook. *h.* Pygidium without anal sucker. Ventral view. *i.* Pygidium with anal sucker. Dorsal view.

Genus **Nerine**, Johnston (sensu Mesnil)

Nerine sp.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear OTL. Bottom: mud. Two specimens.

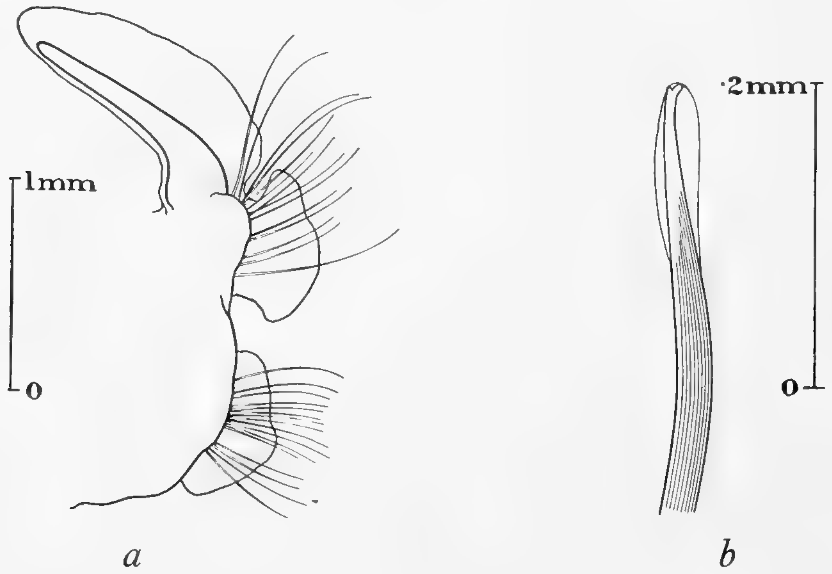


Fig. 56. *Nerine*, sp.

a. Anterior foot. *b*. Bidentate hook.

Description. Two rather ill-preserved anterior fragments, the largest of which has 24 chaetigers and measures 15 mm. by 3 mm. The body is stout and massive and the gills give it a foliaceous appearance.

The prostomium is an elongated plate rounded in front and ending behind in a small knob, which I take to represent an occipital tentacle. The palps are lost, and there are no eyes. The hinder end of the prostomium reaches to the middle of the 1st chaetiger. The 1st chaetiger has an oval dorsal lamella, a rounded ventral lamella and capillary bristles in both rami. The gills begin on the 2nd chaetiger and are continued to the ends of the fragments. They are large and fused with an upward extension of the dorsal lamella (Fig. 56, *a*). The ventral lamella is vertically elongated and with a rounded edge. Both dorsal and ventral bristles are capillary until the 21st chaetiger, where, in addition to the capillary bristles, a row of 15 bidentate hooded hooks (Fig. 56, *b*) appears in the ventral ramus.

Remarks. These fragments probably belong to *Nerine*, but the few anterior segments of which they consist do not show any hooks in the dorsal rami. The closely allied *Nerinides* has no capillary bristles in the dorsal ramus of the 1st chaetiger, as well as no hooks in the dorsal ramus. I know no *Nerine* in which the ventral hooks appear as early as the 21st chaetiger, and I have found no previous record of a *Nerine* from Antarctic waters.

Genus **Prionospio**, Malmgren

Prionospio africana, Augener.

Augener, 1918, p. 402, pl. vi, figs. 162 and 163, text-fig. 51.
? *Prionospio*, sp., Söderström, 1920, p. 238, figs. 137, 148 and 149.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo. From 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. 58–67 m. Gear OTL. Bottom: mud and fine sand. One specimen.

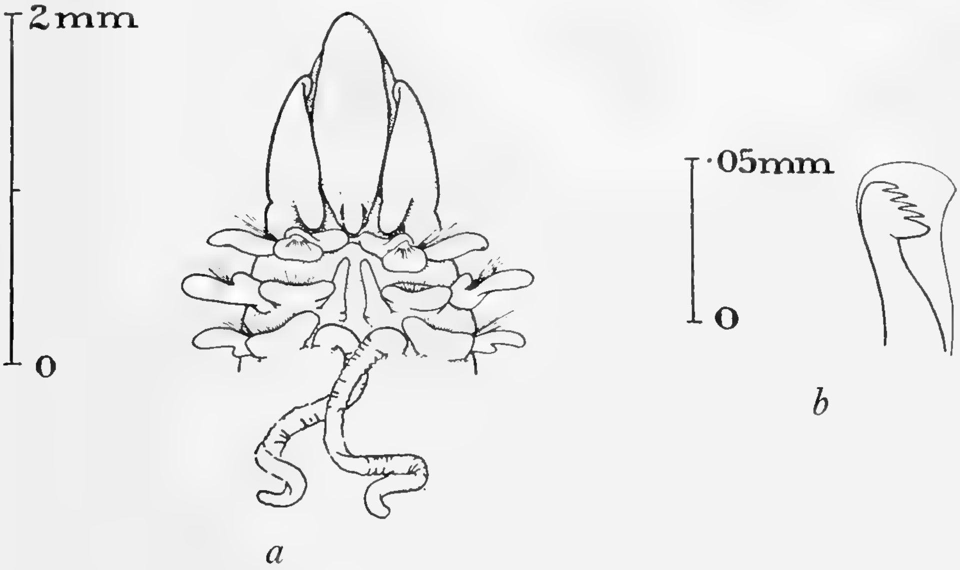


Fig. 57. *Prionospio africana.*
a. Anterior end. Dorsal view. *b.* Hook.

Description. One specimen measuring 24 mm. by 1·5 mm. It has 37 chaetigers and is incomplete posteriorly. The colour in spirit is a pale reddish brown. The prostomium is fusiform with rounded ends (Fig. 57, *a*). The palps are missing. On the posterior end of the prostomium is a pair of faint longitudinal parallel markings which I take to be eye pigment.

The buccal segment on its lateral and ventral surfaces sends forward a large collar, open on the dorsal surface, which extends for about two-thirds the length of the prostomium. The appearance from the side is similar to that of Söderström's (*loc. cit.*) fig. 137. Behind the prostomium the notopodium of the 1st chaetiger sends out two processes which meet in the mid-dorsal line.

The 1st chaetiger has a triangular cirrus, dorsal and ventral bristle bundles and a rounded ventral cirrus. The foot, however, is a little smaller than the following feet. There is no gill on the 1st chaetiger. The 2nd chaetiger has small gills slightly longer than the large dorsal cirrus and unfeathered. The 3rd chaetiger has large feathered gills equal in length to the following five segments. The 4th chaetiger has no gills. There are therefore on this specimen two pairs of gills only.

Söderström's fig. 149 is an accurate diagram of the relative sizes of the dorsal cirri, except that the 1st dorsal cirrus is considerably larger relatively to the 2nd, the relation being similar to that shown in his fig. 137.

Both rami of the feet carry very thick bundles of capillary bristles. The hooks (Fig. 57, *b*) begin on the 9th chaetiger in the ventral ramus, and there is also at its lowest point a sabre-shaped bristle which is usually broken. The dorsal ramus of the last foot of the present fragmentary specimen shows no hooks.

REMARKS. *P. pinnata*, Ehlers, *P. africana*, Augener, and *P. sexoculata*, Augener, are all distinguished by the collar round the prostomium and the presence of a gill on the 1st chaetiger. Caullery (1914) has suggested a sub-genus *Paraprionospio* for those forms in which the first pair of parapodia is similar to those following and carries a gill.

Söderström contends, I think justly, that in these forms the 1st chaetiger is morphologically the equivalent of the 2nd chaetiger in *Prionospio sensu stricto*. The bristles of the 1st chaetiger have disappeared and the feet are modified to form the collar. The two processes meeting in the middle line behind the head, as already described, may possibly represent part of the modified 1st chaetiger. If this is so, in the present specimen the gills do not begin before the 3rd true chaetiger. But the gills from the first bristle-bearing segment (2nd chaetiger) may have been lost.

The *Prionospio* sp. of Söderström (*loc. cit.*) is very close to this species, if not identical with it. Söderström, however, writes, "Ventral cirrus, notopodium and neuropodium of the first bristle segment degenerate; dorsal cirrus not distinguishable." This is not shown in his fig. 137 and differs from the condition in *P. africana*.

In spite of the differences in the number and arrangement of the gills between the present specimen and Augener's original examples I think it probably belongs to Augener's species.

Augener records three pairs of gills all of about the same size, the first pair occurring on the 1st chaetiger.

Family PARAONIDAE, Cerruti

Genus **Paraonis**, Grube

Paraonis (Paraonides) gracilis (Tauber).

Levinsenia gracilis, Mesnil and Caullery, 1898, p. 136.
Levinsenia gracilis, Cerruti, 1909, p. 468.
? *Paraonis dubia*, Augener, 1924, p. 72, fig. 25.

St. 29. 16. iii. 26. West Cumberland Bay, South Georgia. 5·9 miles S 51° W of Jason Light. 23 m. Gear DC. Bottom: mud and stones. Ten specimens.

REMARKS. Ten examples of this rare family, that are rather doubtfully conspecific with the specimens originally described by Tauber from Denmark. They are rolled into tight coils, which makes accurate measurement impossible. The size is about 20 mm. by ·5 mm. for 80–100 chaetigers. There are no colour markings. The prostomium,

when seen from above, is triangular in outline and ends in a sharp point, which I take to represent the terminal tentacle mentioned by Mesnil and Caullery. There is only a single achaetous segment, the buccal segment, behind the prostomium (Fig. 58, *a*).

I can find no dorsal cirrus on the 1st chaetiger and the upper and lower bristle bundles issue directly from the body wall without any parapodial lobes. In the 2nd and following chaetigers there is a small papilliform dorsal cirrus. Mesnil and Caullery state that the first three chaetigers are clearly smaller than those that follow. My specimens do not show this.

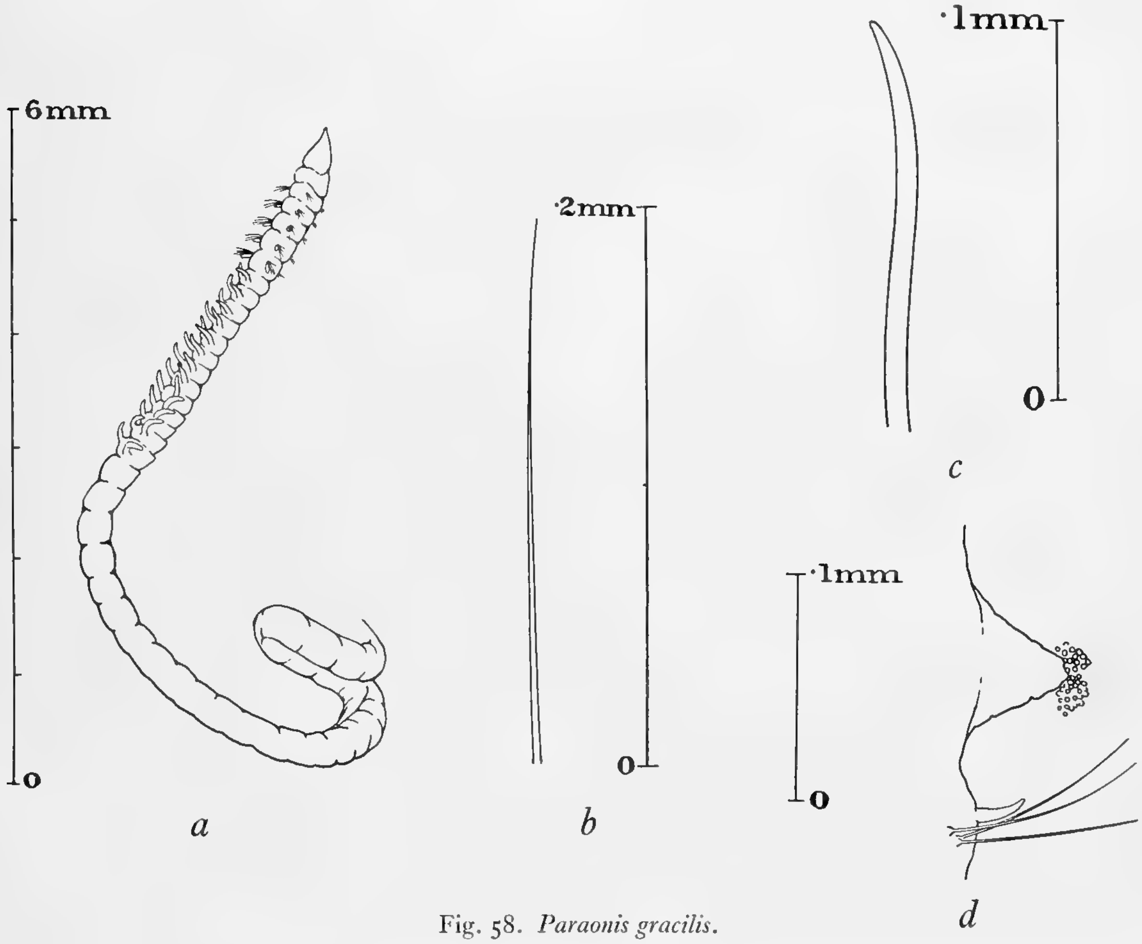


Fig. 58. *Paraonis gracilis*.

a. Anterior end. (The feet are not shown behind the 5th chaetiger.) *b*. Capillary bristle. *c*. Hook. *d*. Dorsal view of foot and genital papilla.

The gills begin on the 6th–7th chaetiger and continue to the 18th–20th chaetiger. They are simple strap-like structures, arching over the back. The gill-bearing region of the body is flattened dorsally and rounded ventrally and the limits of the segments are clearly marked. Behind this region the body is cylindrical and the limits of the segments are almost impossible to distinguish. From the distance apart of the chaetal bundles it can be seen that the segments are about twice as long as in the anterior region. The posterior region of the body looks much more like a fragment of some microdrilid Oligochaete, such as *Nais*, than part of a Polychaete.

In the anterior region the bristles of both bundles are similar; they are very delicate, unbordered capillaries (Fig. 58, *b*) and in the preparations the ends are often twisted. Between the 20th and 25th feet a shorter and much stouter hook (Fig. 58, *c*) appears in the ventral bristle bundle: these hooks increase in number posteriorly; until towards the end of the body they are about six in number with a few capillaries amongst them.

In the hinder region I can see no dorsal cirrus, and the notopodium is represented by a few fine capillary bristles. The specimens are too imperfect to make out a pygidium.

Mesnil and Caullery write "Du 30ᵉ au 40ᵉ sétigère, il existe un mamelon transversal très net en avant des soies." I take this to refer to the genital papillae (Fig. 58, *d*) which, from about the 30th to the 60th chaetiger, lie a little below and in front of the feet.

REMARKS. These specimens agree in the main with Mesnil's account of Tauber's species, but more material both from the north and the south is required before the identity of the forms from the two hemispheres can be established with certainty.

Family CHAETOPTERIDAE

Chaetopterus variopedatus (Renier).

Fauvel, 1927, p. 77, fig. 26 *a–n*.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. Three specimens and three large tubes.

St. 222. 23. iv. 27. St Martin's Cove, Hermite Island, Cape Horn. 30–35 m. Gear **NRL**. One specimen.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola. From 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. 64–65 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. WS 80. 14. iii. 27. 50° 57′ 00″ S, 63° 37′ 30″ W. From 50° 58′ 00″ S, 63° 39′ 00″ W to 50° 55′ 30″ S, 63° 36′ 00″ W. 152–156 m. Gear **OTC**. Bottom: fine dark sand. Two specimens.

St. WS 81. 19. iii. 27. 8 miles N 11° W of North Island, West Falkland Island. From 51° 30′ 00″ S, 61° 15′ 00″ W to 51° 30′ 30″ S, 61° 10′ 00″ W. 81–82 m. Gear **OTC**. Bottom: sand. Eight specimens.

St. WS 88. 6. iv. 27. 54° 00′ 00″ S, 64° 57′ 30″ W. From 54° 00′ 00″ S, 65° 00′ 00″ W to 54° 00′ 00″ S, 64° 55′ 00″ W. 118 m. Gear **OTC**. Bottom: sand, shell and stones. One specimen.

St. WS 128. 10. vi. 27. West side of Gough Island, inshore. 40° 19′ 00″ S, 10° 04′ 00″ W. 120–90 m. Gear **DLH**. Several fragments of tubes.

REMARKS. The greater part of these specimens consists of fragments only. Port Stanley, East Falkland Island, however, yielded two intact specimens, the largest of which has 10 thoracic chaetigers, 5 median chaetigers and 28 posterior chaetigers. In all the specimens in which it is possible to make a count, there are 9 to 10 thoracic and 5 middle chaetigers. I cannot accept Augener's suggestion (1918, p. 458) that the *Ch. variopedatus*, Ehlers, from Southern America should be regarded as a distinct species, *Ch. antarcticus*, Kinberg.

Genus **Phyllochaetopterus**, Grube

(Claparède char. emend.)

Phyllochaetopterus socialis, Claparède.

Fauvel, 1927, p. 84, fig. 30 *a–e*; and 1916, p. 451, pl. ix, figs. 44–47, text-fig. 1, with synonymy.

St. 272. 30. vii. 27. Off Elephant Bay, Angola. From 13° 11′ 00″ S, 12° 44′ 45″ E to 13° 09′ 45″ S, 12° 46′ 00″ E. 73–91 m. Gear **OTL**. Bottom: green mud and sand. Numerous specimens.

REMARKS. A large cluster of intertangled, indistinctly annulated tubes from which I extracted a number of small examples of this species. The average size is about 15 mm. by 1 mm. They are typical specimens of this species with red bands on the palps, 13 to 14 thoracic chaetigers and 7 to 8 median chaetigers.

Phyllochaetopterus, sp.

St. 146. 8. i. 27. 53° 48′ 00″ S, 35° 37′ 30″ W. 728 m. Gear **DLH**. Bottom: rock. Three fragmentary tubes.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Bottom: green mud. Gear **OTL**. Ten tubes and three fragmentary specimens. Gear **N 4–T**. Two fragmentary specimens.

DESCRIPTION. The tubes are large, separate, indistinctly annulated and probably incomplete. The largest measures 22 mm. in length by 4 mm. in diameter. The badly preserved fragments do not permit of a complete account of the systematic characters of this form. The anterior thoracic region has nine chaetigers and measures 12 mm. by 5 mm. The thoracic region is a pale yellowish green and the middle and posterior regions are dark green, the posterior being darker than the middle region.

The anterior end is damaged: there is a pair of large globular tentacles supported internally by a number of fine bristles. A large white glandular cushion extends on the under side from the 6th to the 8th chaetiger.

The lanceolate bristles of the thoracic region are similar to those found in *P. socialis*. The giant bristle from the 4th chaetiger is obliquely truncated, slightly excavated at the end and with a finely crenellated apex. It is similar to that figured by Fauvel (1927, fig. 31 *b*) for *P. major*.

The notopodia of the median region are bilobed with a large accessory lamella (? branchia) lying between notopodium and neuropodium. There are two long median segments and possibly more, for the only fragments showing the median region are badly damaged. The 2nd median chaetiger is bilobed and similar to the 1st. I cannot tell whether the median neuropodia are bilobed or unilobed.

The posterior region has numerous segments. Except towards the end of the body the notopodia are free towards their ends only, a condition similar to that found in *Mesochaetopterus*. The terminal segments, however, have projecting notopodia. Each notopodium has four to six lanceolate bristles. The posterior neuropodia are bilobed with rows of subtriangular uncini with very numerous fine teeth.

REMARKS. This is the first record of a Chaetopterid from Antarctic waters except for *P. pictus*, Crossland (= *P. socialis*, Claparède, *fide* Fauvel) recorded by Augener from the sub-Antarctic Auckland Islands: unfortunately the condition is so unsatisfactory that I cannot assign it to a species. It seems to be close to *P. major*, Claparède, but that species is described as having only a single lanceolate bristle in the posterior notopodia.

Family CIRRATULIDAE

Genus **Audouinia**, Quatrefages sensu Fauvel

Audouinia filigera (Delle Chiaje) var. **capensis** (Schmarda).

Cirratulus capensis, Schmarda, 1861, p. 56, pl. xxvii, fig. 213.
Cirratulus capensis, auctorum.
Cirratulus cirratus (O. F. Müller), McIntosh, 1904, p. 67.
Non *Cirratulus cirratus* (O. F. Müller).

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa. Basin of H.M. Dockyard. 0–2 m. Gear **NH**. Eleven specimens.

REMARKS. This form seems to be identical with *A. filigera* (Delle Chiaje) except that the tentacles are on the 3rd and 4th chaetigers instead of the 4th and 5th or 5th and 6th. Fauvel, in his account of *A. filigera* (1927, p. 92), states that the gills are above the dorsal ramus at a distance equal to or greater than that which separates the two rami. This is true only from about the 40th chaetiger: in front of the 40th chaetiger the distance between the gill and the dorsal ramus is less than that which separates the two rami.

Genus **Cirratulus**, Lamarck

Cirratulus cirratus (O. F. Müller).

Fauvel, 1927, p. 94, fig. 33 *a–g*, with synonymy; and 1916, p. 447, pl. viii, fig. 12.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Seven specimens.

St. 145. 7. i. 27. Stromness Harbour, South Georgia. Between Grass Island and Tonsberg Point. 26–35 m. Gear **BTS**. Five specimens.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear **BTS**. Bottom: mud and sand. Nine specimens.

St. WS 62. 19. i. 27. Wilson Harbour, South Georgia. 15–45 m. Gear **BTS**. Three specimens.

St. WS 73. 6. iii. 27. 51° 01′ 00″ S, 58° 54′ 00″ W. From 51° 02′ 00″ S, 58° 55′ 00″ W to 51° 00′ 00″ S, 58° 53′ 00″ W. 121–130 m. Gear **OTC**. Bottom: fine dark sand. One specimen.

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. From 49° 00′ 00″ S, 62° 00′ 00″ W to 49° 01′ 00″ S, 61° 56′ 00″ W. 146–145 m. Gear **OTC**. Bottom: sand, gravel and stones. One specimen.

St. MS 6. 12. ii. 25. East Cumberland Bay, South Georgia. ¼ mile S of Hope Point to 1¼ cables S × E of King Edward Point Light. 24–30 m. Gear **BTS**. Nine specimens.

St. MS 66. 28. ii. 26. East Cumberland Bay, South Georgia. $2\frac{1}{4}$ miles SE of King Edward Point Light to $1\frac{1}{2}$ cables W × N of Macmahon Rock. 18 m. Gear NCS–T. ? One specimen, young.

St. MS ?. South Georgia. Shore collection. One specimen.

REMARKS. The specimen from the South Georgia shore collection is a uniform deep purple in colour. The specimen from WS 97 has the two groups of tentacular filaments very forward in position, so that they appear to be on the last achaetous segment rather than on the 1st chaetiger.

Cirratulus antarcticus, n.sp.

St. 29. 16. iii. 26. West Cumberland Bay, South Georgia. 5·9 miles S 51° W of Jason Light. 23 m. Gear DC. Bottom: mud and stones. Ten specimens.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear N 4–T. Bottom: grey mud. Five specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear NCS–T. Bottom: grey mud. Four specimens. Gear OTL. Three specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear OTL. Bottom: green mud and stones. Two specimens.

DESCRIPTION. The largest complete specimen measures 26 mm. by 2 mm. The body is long and rather slender with very crowded segments. The prostomium is rather short and bluntly conical; it has no eyes; the two achaetous segments behind the buccal segment are not clearly distinguished. The first two chaetigers have no branchiae. These begin on the 3rd chaetiger and are continued over the greater part of the body. Throughout they arise just above the dorsal ramus. On the 3rd to 5th chaetigers there are two groups of tentacular filaments, with six to eight filaments in each group (Fig. 59). They are rather stouter than the branchiae. The feet carry capillary bristles only: there are no hooks. The pygidium is conical and the anus is pointing upwards.

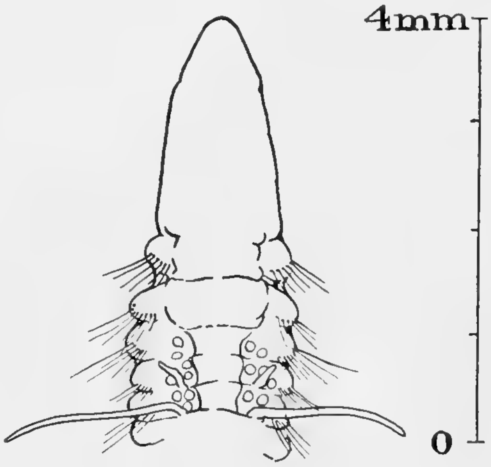


Fig. 59. *Cirratulus antarcticus*. Anterior end.

REMARKS. This species is allied to *C. chrysoderma*, Claparède, from the Mediterranean. The body, however, is more massive and there are six to eight pairs of tentacular filaments instead of two to three. Moreover, in *C. chrysoderma* the anus is ventral, and the tentacular filaments are on the 4th–5th chaetigers.

Cirratulus afer, Ehlers.

Ehlers, 1908, p. 127, pl. xvii, figs. 10–12.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo. From 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. 58–67 m. Gear **OTL**. Bottom: mud and fine sand. Two specimens.

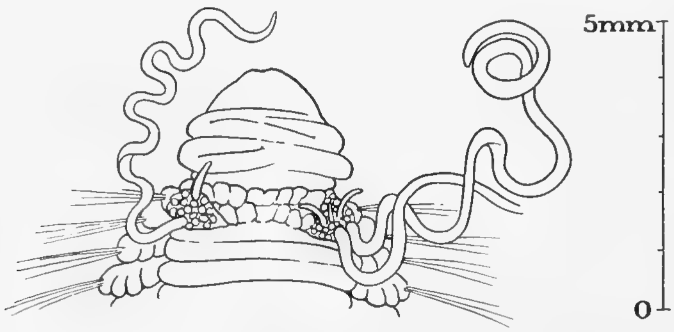


Fig. 60. *Cirratulus afer*. Anterior end.

Remarks. I have much hesitation in referring these forms to Ehlers' species. One of the specimens is complete and measures 83 mm. by 11 mm. for 150 chaetigers. This specimen is much larger than those seen by Ehlers. The general proportions of the body are similar to those described by Ehlers. The prostomium is very short and as if telescoped into the buccal segment. The two tentacular groups, each of 10 to 12 filaments, are on the 1st chaetiger and apparently spread over a considerable area of the last achaetous segment (Fig. 60). According to Ehlers there is a single filament on the 1st chaetiger and a group of filaments on the 2nd. Moreover, I can find no trace of hooks in my specimens. In Ehlers' specimens their occurrence seems to be very irregular, or they may be absent. The gills seem to be continued over the greater part of the body, and their insertion is just above the dorsal ramus.

Genus **Dodecaceria**, Oersted

Dodecaceria concharum, Oersted.

Fauvel, 1927, p. 102, fig. 36 *a–n*.

St. 2. 17. xi. 25. Clarence Bay, Ascension Island, Catherine's Point and Collyer Point. Shore collection. One specimen.

Remarks. A single atocous sedentary ripe female with five pairs of gills.

Genus **Heterocirrus**, Grube

(Saint-Joseph char. emend.)

Heterocirrus caput-esocis, Saint-Joseph, var. **capensis** var. nov.

Heterocirrus caput-esocis, Fauvel, 1927, p. 97, fig. 33 *l–m*.

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa. Basin of H.M. Dockyard. 0–2 m. Gear **NH**. Six specimens.

Description. The average measurement is about 20 mm. by 2 mm. at the widest part: there are 80–90 chaetigers. The body is tapered at both ends, suddenly at the anterior end and gradually at the posterior. It is at its broadest from the 10th to the 40th chaetiger. In spirit all pigment has disappeared. The prostomium (Fig. 61) is shorter and blunter than that figured for *H. caput-esocis* (Fauvel, *loc. cit.* fig. *l*). Instead of a pair of round eye spots, there is a row of small eye spots interrupted in the middle line as in *Cirratulus cirratus*.

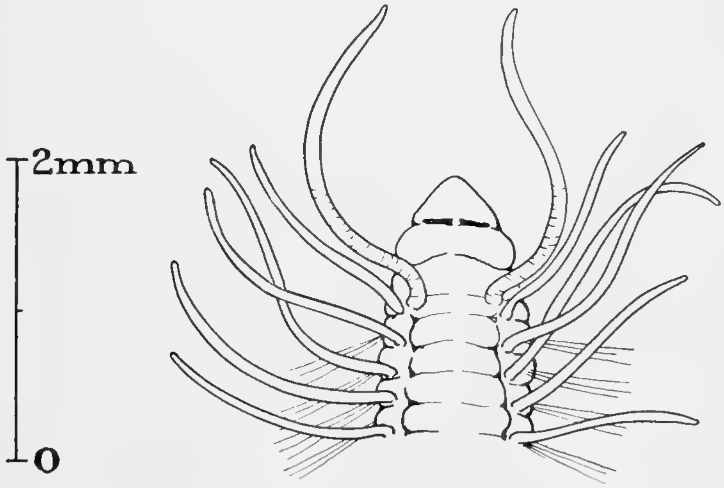


Fig. 61. *Heterocirrus caput-esocis*, var. *capensis*. Anterior end.

The buccal and the following achaetous segments are not clearly distinguished. Just in front of the 1st chaetiger is a pair of long coiled palps, and a little behind and below these a pair of gills. Most of the gills are lost, and I can find none behind the 15th chaetiger; further back they are either absent or broken off.

There are dorsal and ventral capillary bristles in all the feet, and from about the 15th neuropodium and 20th notopodium there are also simple unidentate hooks. I can see no ventral folds round the anus.

Remarks. This form is close to *H. caput-esocis*, but differs from it in the shape of the head and eyes, and in the presence of notopodial hooks behind the 20th chaetiger instead of in the terminal feet only.

Genus **Tharyx**, Webster and Benedict

Tharyx epitoca, n.sp.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. One specimen. Gear **N 4–T**. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH**. Bottom: stones, mud and rock. One specimen.

Description. Two epitocous females, swollen with eggs. The largest measures 27 mm. by 3 mm. at the widest part, for about 50 chaetigers. The body is fusiform,

and about the last 20 chaetigers are free from eggs. The prostomium is bluntly conical and without eyes. The buccal and the two (?) following segments are long, achaetous and indistinctly separated. As in *Heterocirrus* (see Fauvel, 1927, p. 96), on the last achaetous segment or on the anterior border of the 1st chaetiger there is a pair of gills and a pair of coiled palps (Fig. 62) which are about equal in length to the first ten chaetigers. The gills are for the most part lost, but it can be seen that they are continued for at least the anterior two-thirds of the body. They are very long, a gill from the middle of the body being equal in length to about 15 chaetigers in the middle of the body. After the 30th chaetiger the body is no longer swollen with eggs, and the segments are half the length of those in the sexual region.

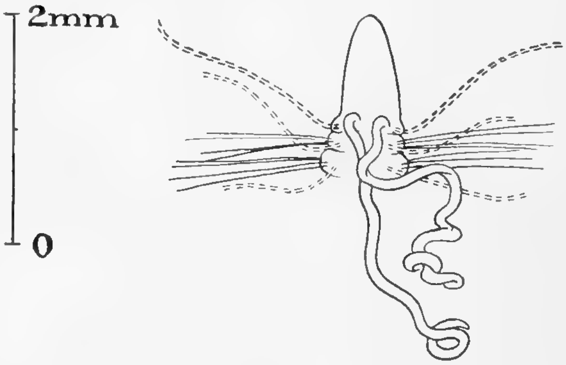


Fig. 62. *Tharyx epitoca.* Anterior end. (Position of the gills indicated by the broken lines.)

The bristles consist of very long fine capillary chaetae, in length about equal to twice the breadth of the body. There are no hooks.

The pygidium is conical and the anus terminal.

REMARKS. The position of the first gill and palp would seem to refer this form to *Heterocirrus*, Grube; on the other hand, the absence of crochets in the feet is characteristic of *Tharyx*. This species is very close to, and possibly identical with, *Heterocirrus cincinnatus*, Ehlers (1908, p. 129) from 48° 57′ S, 70° W. The differences are these: Ehlers' type specimen measured 18 mm. by 1·5 mm. for 110 segments; Ehlers states that towards the posterior end of the body the segments are longer than in the middle; Ehlers describes a pair of gills only on the last achaetous segment and places the palps on the 1st chaetiger. My specimen measures 27 mm. by 3 mm. for 50 chaetigers; towards the posterior end the segments are much shorter than in the middle of the body and both 1st gill and palp are on the same segment. The examples from Auckland Island referred to Ehlers' species by Augener (1924, p. 81) have hooks, and are therefore wrongly attributed.

South Georgia (St. 29. 16. iii. 26. West Cumberland Bay, South Georgia; 5·9 miles S 51° W of Jason Light, 23 m. Gear DC. Bottom: mud and stones) yielded another epitocous female, with all its gills and palps broken or lost. As far as can be seen, the arrangement of the palps and gills is the same as in *Th. epitoca*; on the other hand, the body is much more slender and thread-like and the segments more numerous. The measurements are 30 mm. by ·5 mm. for about 120 chaetigers. The bristles are all capillary. It may be conspecific with my specimen from Bismarck Strait.

Tharyx sp. juv.

St. 30. 16. iii. 26. West Cumberland Bay, South Georgia. 2·8 miles S 24° W of Jason Light. 251 m. Gear **DLH**. Bottom: mud and stones. Four specimens.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NCS–N**. Eight specimens.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. 9¼ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **NCS–T**. Three specimens.

Remarks. I have given this name to a number of small immature Cirratulids, all more or less in poor condition. The average measurement is about 5 mm. by 1 mm. for 30–50 chaetigers. There is a pair of gills and palps on the 1st chaetiger and the gills are continued over the greater part of the body. There are no eyes and no hooks in the bristle bundles. They may be young examples of *Th. epitoca*.

Family FLABELLIGERIDAE, Saint-Joseph

Genus **Stylarioides**, Delle Chiaje

Stylarioides kerguelarum (Grube).

Trophonia kerguelarum, McIntosh, 1885, p. 364, pl. xliv, figs. 9–10; pl. xxxii A, figs. 4–6.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **OTL**. Bottom: grey mud. Six specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 141. 29. xii. 26. East Cumberland Bay, South Georgia. 200 yards from shore under Mount Duse. 17–27 m. Gear **BTS**. Bottom: mud. Sixty-five specimens.

Remarks. An average specimen measures about 18 mm. by 3 mm. without the bristles, and has about 30 chaetigers. This species is close to *St. plumosa* (O. F. Müller); it differs, however, in that the sigmoid ventral crochets begin on the 3rd instead of the 4th chaetiger.

Stylarioides swakopianus, Augener.

Augener, 1918, p. 433, pl. vii, fig. 234, text-figs. 61 and 62.
Stylarioides xanthotricha, Ehlers, *partim*, 1908, p. 119, pl. xvi, fig. 2.

St. 4. 30. i. 26. Tristan da Cunha. 36° 55′ 00″ S, 12° 12′ 00″ W. 40–46 m. Gear **DL**. Bottom: stones. Four specimens.

Remarks. Of these specimens all except one are fragments: the complete specimen measures 33 mm., without the tail, by 4 mm.; the tail measures 6 mm. There is no need for me to recapitulate Augener's arguments for separating this, the shaggy-skinned form, from *St. xanthotricha*. I am still rather doubtful if the two forms are specifically distinct; and both are very close indeed to the European *St. monilifer*.

Except in the matter of the difference in the number of bristles forming the cage, a

difference to which I am inclined to attach little systematic value, the differences between *St. swakopianus* and *St. xanthotricha* are similar to the differences between *St. monilifer* and *St. hirsutus*. According to Fauvel (1927, p. 119) all the intermediate stages between the latter pair of species are found.

Genus **Flabelligera**, M. Sars

Flabelligera affinis, M. Sars.

Fauvel, 1927, p. 113, fig. 40 *a–f*; 1916, p. 450, with synonymies.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. One specimen.

St. 53. 12. v. 26. Port Stanley, East Falkland Island. Hulk of "Great Britain." 0–2 m. Gear **RM**. Two specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **N 7–T**. Bottom: green mud and stones. Two specimens.

St. WS 77. 12. iii. 27. 51° 01′ 00″ S, 66° 31′ 30″ W. From 51° 00′ 00″ S, 66° 30′ 00″ W to 51° 02′ 00″ S, 66° 33′ 00″ W. 110–113 m. Gear **OTC**. ?. South Georgia. One specimen. Bottom: coarse dark sand. Two specimens.

Fig. 63. *Flabelligera affinis*. Elongated papilla.

Remarks. These specimens are mostly in bad condition. I can find nothing to distinguish them from the northern form. Fauvel (1927, *loc. cit.*) writes: "A partir du 25e sétigère une ou deux grosses soies composées ou pseudocomposées, etc." Surely 25e is a printer's error for 2e? I figure a papilla of the elongated kind (Fig. 63).

Flabelligera luctator, Stimpson.

Augener, 1918, p. 452.

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa. Basin of H.M. Dockyard. 0–2 m. Gear **NH**. Two specimens.

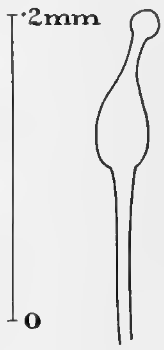


Fig. 64. *Flabelligera luctator*. Elongated papilla.

Remarks. The largest specimen measures 25 mm. by 5 mm. including the mucous sheath for 32 chaetigers. The mucous sheath is so thick that the ends of the bristles are embedded in it. There is only a single hook with a strongly curved blade in each neuropodium. The more elongated type of papilla (Fig. 64) has a different form from that usually found in *Fl. affinis*.

Willey and Fauvel (1916, p. 451) both regard this species as identical with *Fl. affinis*. In all the examples of the latter species that I have seen the shape of the papillae is very constant. Therefore, in view of the difference in the papillae already mentioned, I hesitate to unite the two species. I can find no other distinguishing character.

Flabelligera pennigera, Ehlers.

Ehlers, 1908, p. 123, pl. xvi, figs. 9–10.

St. 141. 29. xii. 26. East Cumberland Bay, South Georgia. 200 yards from shore, under Mount Duse. 17–27 m. Gear **BTS**. Bottom: mud. Two specimens.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **N 4–T**. Bottom: green mud and sand. One specimen.

St. 145. 7. i. 27. Stromness Harbour, South Georgia. Between Grass Island and Tonsberg Point. 26–35 m. Gear **BTS**. Four specimens.

REMARKS. The specimens are in very bad condition, and I cannot count the number of chaetigers. The mucous sheath is very thin. There is normally a single hook only in the neuropodia. The dorsal bristles are completely hidden by thick clusters of papillae, which impart to the notopodia the appearance of gills exactly as described by Ehlers.

Flabelligera mundata, Gravier.

Gravier, 1907, p. 37, pl. iv, figs. 31 and 32.
Benham, 1921, p. 108, with synonymy.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH**. Bottom: stones, mud and rock. One specimen.

REMARKS. A single specimen in good condition measuring 38 mm. by 7 mm. including the sheath, for 27 chaetigers. The branchiae are numerous, the mucous sheath is very thick, and there are for the most part three composite hooks to each neuropodium. The papillae attached to the bristles are as figured by Gravier.

Genus **Brada**, Stimpson

Brada villosa (Rathke).

Fauvel, 1927, p. 121, fig. 43 *e–l*.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. One specimen.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. One specimen.

REMARKS. There is a very thick coating of sand which hides the skin, and I cannot see the usual circlet of papillae around the parapodia. Nevertheless, I believe that this form belongs to the common northern species. The southern *B. mammillata* appears to lack the delicate flagelliform tips to the ventral bristles. I have examined McIntosh's Challenger specimens of the latter species and I can see no trace of these tips. Their absence may be due to wear, but from the appearance of the bristles I do not think that this is so.

Brada mammillata, Grube.

Ehlers, 1901, p. 180, for synonymy.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH**. Bottom: rock. Three specimens.

REMARKS. I cannot find any flagelliform tips to the ventral bristles, which resemble those figured by McIntosh and Studer. Otherwise they do not appear to be separable from *B. villosa*.

Genus **Pycnoderma**, Grube

Pycnoderma congoense, Grube.

Grube, 1877, p. 540.
Augener, 1918, p. 451, text-fig. 58.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola. From 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. 64–65 m. Gear **OTL**. Bottom: grey mud. One specimen.

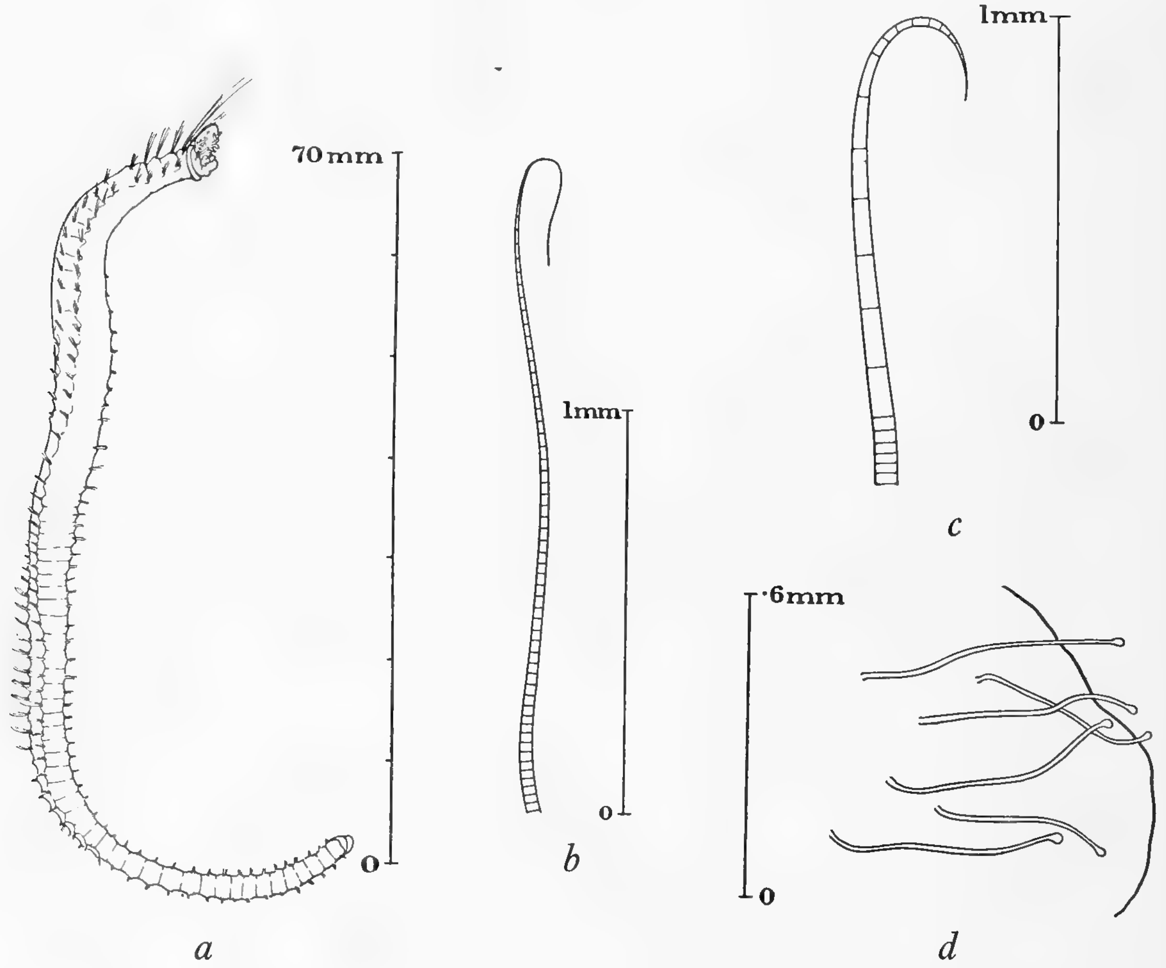


Fig. 65. *Pycnoderma congoense*.
a. Entire specimen. *b*. Dorsal bristle. *c*. Ventral bristle. *d*. Cuticle with papillae.

REMARKS. The body (Fig. 65, *a*) is long and worm-like, measuring 98 mm. by 5 mm. for 69 chaetigers. There are very numerous slender gills and a pair of short thick grooved palps.

The bristles of the cage are few and inconspicuous. The bristles of the 1st chaetiger are all long and forwardly directed: the ventral bristles are shifted dorsally so that they lie close to the dorsal bundle. The dorsal bristles of the 2nd chaetiger are about half the length of those of the 1st, and are also directed forward to form part of the cage. The ventral bristles of the 2nd chaetiger are separated by the normal distance from the dorsal, and are of the characteristic type found throughout the body. They do not form part of the cage. The dorsal bristles of the first four chaetigers are directed forwards.

Dorsal and ventral bristles are figured by Augener (*loc. cit.*). The dorsal (Fig. 65, *b*) are long, thin capillary barred bristles of a transparent white colour; the ventral (Fig. 65, *c*) are twice as thick, pale yellow, and also end in a fine flagelliform tip.

The surface of the specimen is beset with numberless long thread-like papillae (Fig. 65, *d*) with expanded tips.

The tough, transparent, horny, outer layer of the body is, as Grube states, a thick hyaline cuticle and not a mucous sheath homologous with that in *Flabelligera*.

Family SCALIBREGMIDAE

Genus **Scalibregma**, Rathke

Scalibregma inflatum, Rathke.

Fauvel, 1927, p. 123, fig. 44 *a–f*.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Three specimens.

St. 28. 16. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 45° W of Jason Light. 168 m. Gear **DC**. Bottom: mud. One specimen.

St. 148. 9. i. 27. Off Cape Saunders, South Georgia. From 54° 03′ S, 36° 39′ W to 54° 05′ S, 36° 36′ 30″ W. 132–148 m. Gear **OTL**. Bottom: grey mud and stones. One specimen.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. One specimen.

REMARKS. The specimen from St. 28 is, I think, immature. It is pale yellow in the anterior swollen part of the body and pale green in the rest. There is, moreover, a row of small brown eye spots between the horns of the prostomium: these are absent from the other examples.

Family CAPITELLIDAE

Genus **Capitella**, Blainville

Capitella capitata (Fabricius).

Fauvel, 1927, p. 154, fig. 55 *a–h*.

St. MS 67. 28. ii. 26. East Cumberland Bay, South Georgia. 3 cables NE of Hobart Rock to ½ cable W of Hope Point. 38 m. Gear **NCS–T**. One young specimen.

?. Cumberland Bay, South Georgia. Three specimens.

Remarks. All the examples are small and immature. They are easily distinguished from the Antarctic *Isomastus perarmatus*, Gravier, by the presence of hooks only in the 8th and 9th chaetigers. The only other record of this species from colder southern waters is that from Kerguelen.

Capitella capitata (Fabricius), var. **antarctica**, var. nov.

St. MS ?. 13. x. 25. From kelp root, Cumberland Bay, South Georgia. Four specimens.

Description. The largest example measures 110 mm. by 2 mm. for 120 chaetigers. I regard these specimens as representing an intermediate form between *C. capitata* and *Isomastus perarmatus*, Gravier.

The 8th and 9th chaetigers have no capillary chaetae, and in this the specimens are distinct from *I. perarmatus*. On the other hand, the copulatory armature of the male corresponds closely to that of Gravier's species. The modified bristles are plainly visible at maturity, and those of the 8th chaetiger overlie those of the 9th. Exactly as Gravier describes, there are five to six crochets on each side in the 8th chaetiger, and four crochets on each side in the 9th. In the abdomen the pads carrying the rows of hooks are more developed than is usual in *C. capitata*.

This form can be considered either as a *C. capitata*, with an unusually highly developed copulatory apparatus, or as an *I. perarmatus*, in which the capillary bristles are lacking from the 8th and 9th chaetigers.

Genus **Notomastus**, Sars

Notomastus latericeus, Sars.

Fauvel, 1927, p. 143, fig. 49 *a–h*.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Four specimens.

St. 159. 21. i. 27. 53° 52′ 30″ S, 36° 08′ 00″ W. 160 m. Gear **DLH**. Bottom: rock. One specimen.

Remarks. This species has been previously recorded in southern waters from Bouvet Island.

? **Notomastus lineatus**, Claparède.

Fauvel, 1927, p. 145, fig. 51 *a–i*.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH**. Bottom: rock. One specimen.

Remarks. A fragment consisting of 24 chaetigers. I have compared this specimen with a number of examples of this species from Naples, and except that in the Mediterranean examples the branchial prolongations of the ventral tori are larger and more bulbous, I can find nothing to separate them.

A confusion of locality labels may possibly have occurred, for it is otherwise hard to account for the presence of this shallow-water Mediterranean species below the 200 m. line in sub-Antarctic waters.

Family OPHELIIDAE

Genus **Ammotrypane**, Rathke

Ammotrypane breviata, Ehlers.

Ehlers, 1913, p. 523, pl. xxxix, figs. 1–7.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N** 4–T. Bottom: green mud. Nine specimens.

Remarks. The largest example measures 34 mm. by 2 mm. The number of chaetigers is 28. The specimens correspond exactly to the description and figures of this species. They have gills on every chaetiger except the 1st and the last four modified chaetigers. The anal cylinder is very faintly and irregularly ringed, and its dorsal peak is much more prominent than the ventral.

Genus **Travisia**, Johnston

Travisia olens, Ehlers.

Ehlers, 1897, p. 98, pl. vi, figs. 162–163.
Benham, 1927, p. 123.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 115 m. Gear **DLH**. Bottom: fine sand. Two specimens.

Sparrow Cove, Port William, East Falkland Island. 1 m. Net **RM**. One specimen.

Remarks. The terminal segments of these specimens are difficult to count accurately, but there are between 29 and 31 segments. It is also not at all easy to determine the segment on which the posterior or abdominal region, distinguished by the lateral eminences, begins, but I estimate 15–16 posterior segments. The body tapers gradually down to the anal cylinder (Fig. 66) which is equal in length to the last two segments.

Benham (*loc. cit.*) discusses at length the relation of this species to *T. kerguelensis*, McIntosh. I give my views on this matter in my remarks on the latter species.

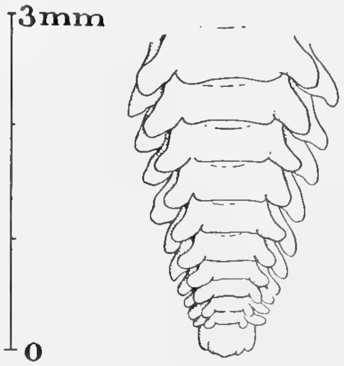


Fig. 66. *Travisia olens.* Pygidium from above.

Travisia kerguelensis, McIntosh.

McIntosh, 1885, p. 357, pl. xliii, fig. 10; pl. xxvi A, figs. 1–2.
Ehlers, 1897, p. 97, pl. vi, figs. 159–161.
Benham, 1927, p. 123.

St. 146. 8. i. 27. 53° 48′ 00″ S, 35° 37′ 30″ W. 728 m. Gear **DLH**. Bottom: rock. Nine specimens.

St. 157. 20. i. 27. 53° 51′ 00″ S, 36° 11′ 15″ W. 970 m. Gear **DLH**. Bottom: diatomic ooze, stones and fine sand. One specimen.

St. 159. 21. i. 27. 53° 52′ 30″ S, 36° 08′ 00″ W. 160 m. Gear **DLH**. Bottom: rock. Three specimens.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH**. Bottom: rock. Three specimens.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. Three specimens.

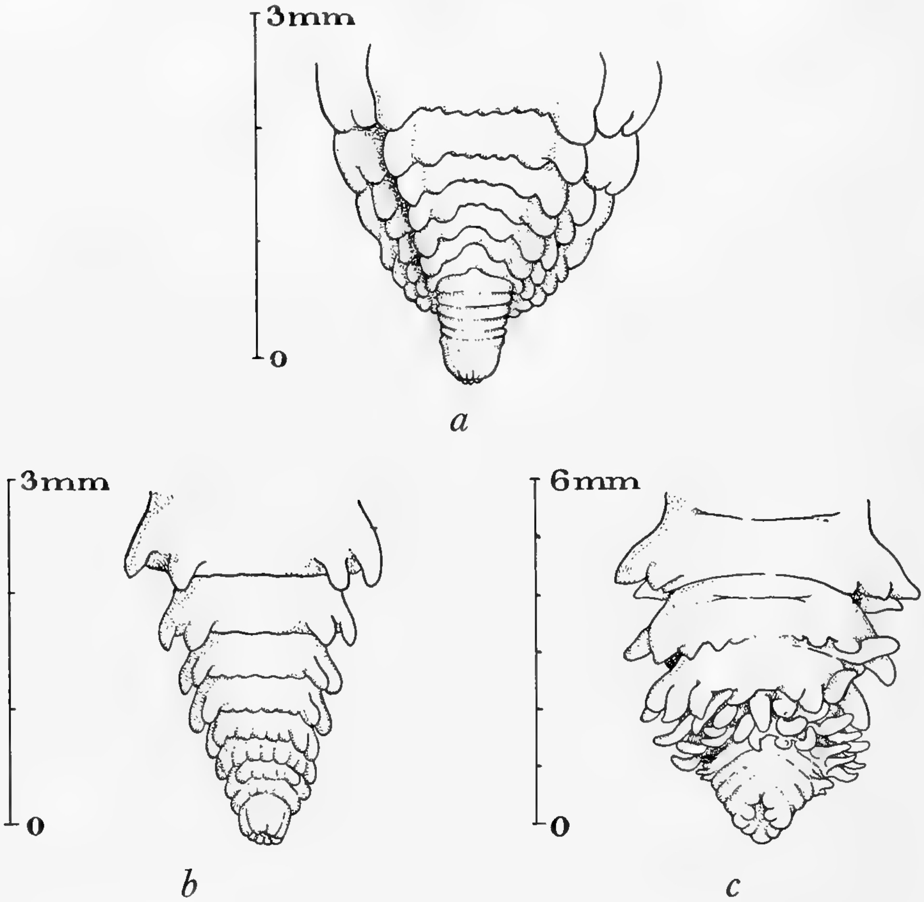


Fig. 67. *Travisia kerguelensis*.
a. Pygidium. *b*. Pygidium. *c*. Pygidium.

REMARKS. There are 23–27 segments. The body does not as a rule taper gradually to the anal cylinder, but the latter comes off rather abruptly from the terminal segment. It is equal in length to the last four segments. The posterior part of the body with the lateral eminences has 10 to 11 segments and not 15 to 16, as in *T. olens*. The edges of the terminal segments may be divided into areas as described by Benham (*loc. cit.*), or they may be faintly laciniated (Fig. 67, *a*), or again deeply serrated (Fig. 67, *b*): finally, these serrations may be modified into large spike-shaped papillae (Fig. 67, *c*). At the other end of the series the terminal segments may be perfectly smooth, and apparently associated with this condition is found a pair of dorsal anal cirri at the end of the anal cylinder. It is possible that these anal cirri may have been present but lost from the papillated and laciniated examples. For the specimens with smooth terminal segments and anal cirri I propose to create a new variety.

Benham attaches some importance to the shape and length in relation to number of segments in his specimens. I cannot follow him here: the examples before me vary in shape from that of a cigar to that of an acorn.

I have examined McIntosh's three co-types, and they vary considerably in their degree of papillation, the most extreme example being serrated rather than strongly papillated. In my view all the intermediate stages between a faint areolation to large papillae are present in this species.

To summarise my remarks, I suggest that *T. olens* should be provisionally separated from *T. kerguelensis*, on the ground that *T. olens* has 29 to 31 segments and *T. kerguelensis* 23 to 27; that *T. olens* has 15 to 16 segments involved in the posterior division of the body and *T. kerguelensis* 10 to 11; and that in *T. olens* the body passes gradually into the anal cylinder which is equal in length to the last two segments, whereas in *T. kerguelensis* the anal cylinder, which is equal in length to the last four segments, comes off more abruptly from the body. Moreover, the terminal segments in *T. olens* are smooth and in *T. kerguelensis* more or less laciniated or papillated.

Ehlers regards *T. olens* as identical with the European *T. forbesii*. The latter species seems to me to be nearer to *T. kerguelensis* than to *T. olens*. Fauvel gives 23 to 26 for the number of segments of *T. forbesii*. I have also observed that the longitudinal furrows of the anal cylinder are fewer and the areas they delimit larger than in *T. kerguelensis*.

Travisia kerguelensis, McIntosh, var. **gravieri**, var. nov.

St. 187. 18. iii. 27. Neumayr Channel, Palmer Archipelago. 64° 48′ 30″ S, 63° 31′ 30″ W. 259 m. Gear **DLH**. Bottom: mud. Nine specimens.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 315 m. Gear **DLH**. Bottom: mud and rock. Three specimens.

Remarks. This variety differs from *T. kerguelensis* in the absence of papillation or laciniation of the terminal segments, and in the presence of a pair of short dorsal anal cirri (Fig. 68) at the end of the anal cylinder. I have named this variety after my esteemed colleague, Prof. C. Gravier of Paris.

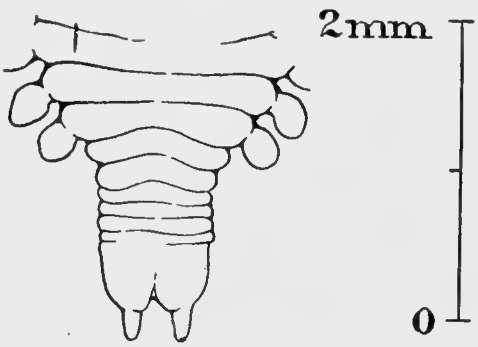


Fig. 68. *Travisia kerguelensis*, var. *gravieri*. Pygidium.

Genus **Kesun**, Chamberlin

Kesun abyssorum, n.sp.

St. 177. 5. iii. 27. 27 miles SW of Deception Island, South Shetlands. 63° 17′ 30″ S, 61° 17′ 00″ W. 1080 m. Gear **DLH**. Bottom: mud and stones. One specimen.

Description. The body (Fig. 69, *a*) is acorn-shaped from contraction, and measures 21 mm. for 23 chaetigers. The diameter is 6 mm. at its widest part. There is a very short, blunt, smooth prostomium, followed by a triannulate buccal segment with paired

nuchal pits. Apart from the prostomium the surface of the body is granular or finely vesicular; and as described by Chamberlin for *Kesun fusus*, each annulus is marked by a row of fine but distinct vesicular papillae. There is no trace of gills.

In the anterior portion of the body the bristle bundles are borne on small papillae, and above and below the foot are one or two papillae much larger than the other papillae of the middle annulus (Fig. 69, *b*). From about the 12th chaetiger all the papillae

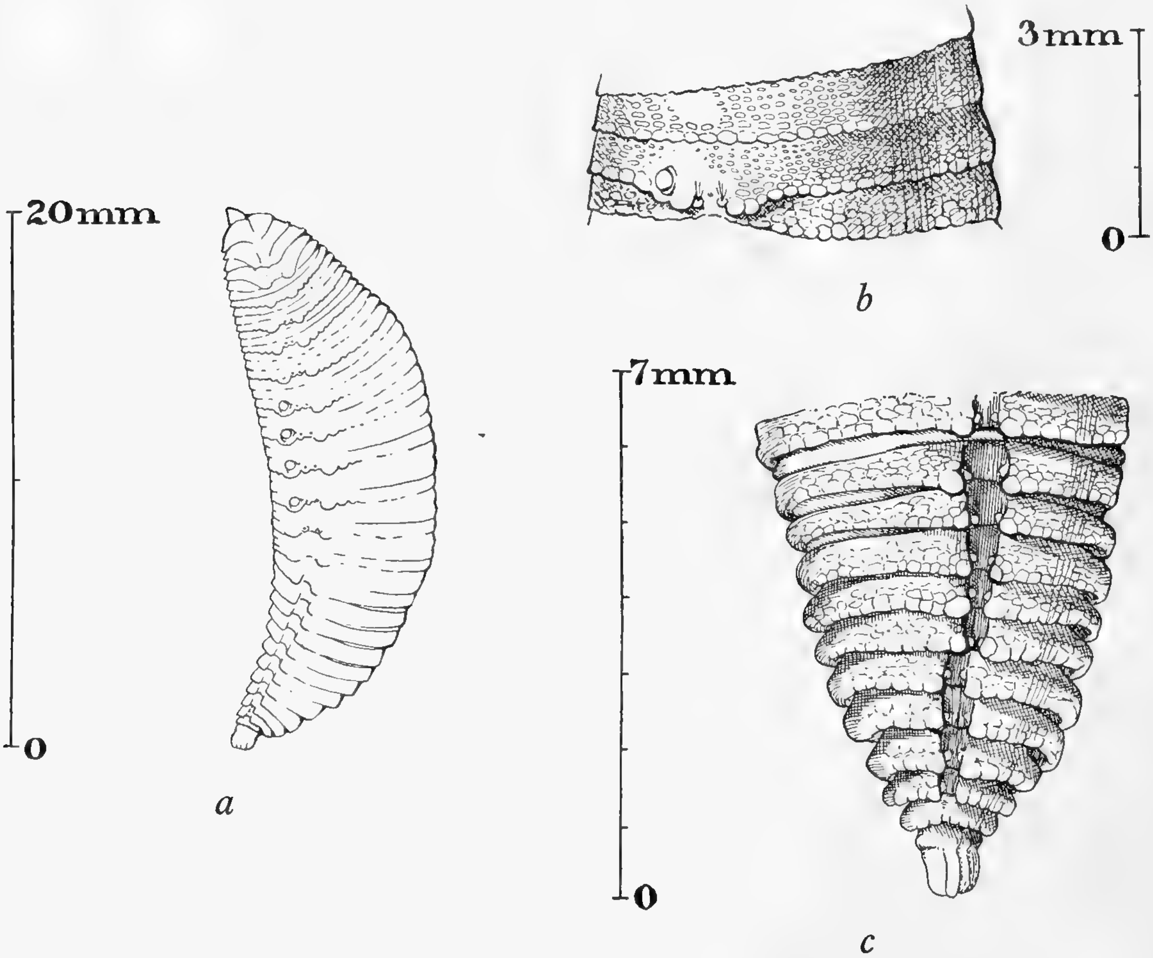


Fig. 69. *Kesun abyssorum*.

a. Entire specimen. *b*. 8th chaetiger. *c*. Terminal segments from the side.

of the middle ring increase in size till they equal the papillae lying above and below the foot. Consequently, for the last ten segments, the bristle bundles lie in a deep groove (Fig. 69, *c*), the sides of which are formed by the annulus in which the feet lie. The terminal segments are uniannulate. The lateral prominences so conspicuous in *Travisia* are wholly absent.

From the 6th to the 9th chaetigers inclusive, there is on each side below the foot an enormous oval nephridiopore, the vertical diameter of which is about equal to the distance between the bristle bundles. Between the bristle bundles sensory pits are

present as in *Travisia*. The anal cylinder is about equal in length to the last two segments, and faintly longitudinally furrowed.

REMARKS. This form is allied to *Kesun fusus*, Chamberlin: it differs in the number of segments and in the possession of a deep posterior groove in which the feet lie.

Family MALDANIDAE

Genus **Maldane**, Grube (Malmgren char. emend.)

Maldane decorata, Grube.

Augener, 1918, p. 475, pl. vii, figs. 191–194, text-fig. 75.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola. From 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. 64–65 m. Gear **OTL**. Bottom: grey mud. Eight specimens.

REMARKS. A complete specimen measures 128 mm. by 4 mm., which is twice as large as the measurements given by Augener. There are 19 chaetigers and two achaetous preanal segments. The head and the first two chaetigers are dorsally mottled with small reddish brown spots. Glandular areas are present on the back from the 3rd to the 6th chaetiger. The thick glandular pads on which the tori lie reach their greatest prominence at the 8th chaetiger. The bristles are well figured by Augener. The border of the anal plate is entire.

Maldane sarsi, Malmgren, var. **antarctica**, Arwidsson.

Arwidsson, 1911, p. 32, pl. i, figs. 23–26; pl. ii, figs. 50–54.

St. 123. 15. xii. 26. Off mouth of Cumberland Bay, South Georgia. From 4·1 miles N 54° E of Larsen Point to 1·2 miles S 62° W of Merton Rock. 230–250 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 177. 5. iii. 27. 27 miles SW of Deception Island, South Shetlands. 63° 17′ 30″ S, 61° 17′ 00″ W. 1080 m. Gear **DLH**. Bottom: mud and stones. One specimen.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. One specimen.

St. 182. 14. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 21′ 00″ S, 62° 58′ 00″ W. 278–500 m. Gear **N 7–T**. Bottom: mud. One specimen.

St. 186. 16. iii. 27. Fournier Bay, Anvers Island, Palmer Archipelago. 64° 25′ 30″ S, 63° 02′ 00″ W. 295 m. Gear **DLH**. Bottom: mud. One specimen.

St. 192. 27. iii. 27. Off Cape Kaiser, Brabant Island, Palmer Archipelago. 64° 14′ 00″ S, 61° 49′ 00″ W. 750 m.; on lead. One specimen.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear **DLH**. Bottom: mud and stones. 30 specimens.

REMARKS. Arwidsson has given a full and careful account of this species, which he separates from the northern form on differences in the distribution of the glandular areas. He has specialized in the Maldanids, and I follow his naming.

Genus **Rhodine**, Malmgren

Rhodine intermedia, Arwidsson.

Arwidsson, 1911, p. 11, pl. i, figs. 5–11; pl. ii, figs. 39–41.
Rhodine loveni, Willey, 1902, p. 276, pl. xlvi, figs. 3–5.
Rhodine loveni, Gravier, 1911, p. 125, pl. ix, figs. 110–112; pl. x, fig. 114; pl. xi, fig. 133.
? *Rhodine antarctica*, Gravier, 1906, p. 39, pl. iv, figs. 33–37, text-fig. 24.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. One fragment.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Ten specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. One specimen.

St. 141. 29. xii. 26. East Cumberland Bay, South Georgia. 200 yards from shore under Mount Duse. 17–27 m. Gear **BTS**. Bottom: mud. Five specimens.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH**. Bottom: rock. One specimen.

St. 187. 18. iii. 27. Neumayr Channel, Palmer Archipelago. 64° 48′ 30″ S, 63° 31′ 30″ W. 259 m. Gear **DLH**. Bottom: mud. One specimen.

REMARKS. There are glandular bands from the 3rd to the 10th segment, and double rows of crochets on the 4th to the 14th chaetiger. The segmental collars reappear on the 17th to 18th chaetigers.

I have nothing to add to Arwidsson's comprehensive study of this species. That which Gravier figures as the pygidium of his *R. antarctica* has much the appearance of the end of an incomplete specimen, the supposed anus being possibly the constriction where the delicately joined segments are apt to break off. I figure the posterior end of a specimen (Fig. 70).

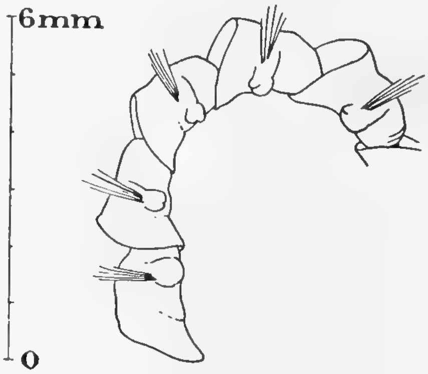


Fig. 70. *Rhodine intermedia*. Posterior segments.

Finally, *R. intermedia* does not seem to be clearly distinguished from *R. loveni*.

Genus **Lumbriclymenella**, Arwidsson

Lumbriclymenella robusta, Arwidsson.

Arwidsson, 1911, p. 3, pl. i, figs. 1–4; pl. ii, figs. 32–36.
Fauvel, 1916, p. 456.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. One specimen.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. One specimen.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear **DLH**. Bottom: mud and stones. Three specimens.

REMARKS. I have nothing to add to Arwidsson's and Fauvel's accounts of this species.

Genus **Clymenella**, Verrill

Clymenella minor, Arwidsson.

Arwidsson, 1911, p. 24, pl. i, figs. 17–22; pl. ii, figs. 44–46.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Off kelp root. Gear **OTL**. Bottom: fine sand. Four specimens.

St. WS 78. 13. iii. 27. 51° 01′ 00″ S, 68° 04′ 30″ W. From 51° 01′ 00″ S, 68° 02′ 00″ W to 51° 01′ 00″ S, 68° 07′ 00″ W. 95 m. Gear **DC**. Bottom: fine dark sand. One specimen.

REMARKS. The fragmentary material at my disposal does not permit me to add anything to Arwidsson's account of this species.

Genus **Clymene**, Savigny

Clymene kerguelensis (McIntosh).

Praxilla kerguelensis, McIntosh, 1885, p. 405, pl. xlvi, fig. 7; pl. xxv A, fig. 6.
Praxillella antarctica, Arwidsson, 1911, p. 19, pl. i, figs. 12–15; pl. ii, figs. 42–43.
Clymene kerguelensis, Fauvel, 1916, p. 457, pl. ix, figs. 48–49.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Two specimens.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. One specimen.

REMARKS. This species has already been carefully studied by the above authors.

Clymene (Isocirrus) yungi (Gravier).

Isocirrus yungi, Gravier, 1911, p. 122, pl. ix, fig. 109; pl. x, figs. 115–120.
Benham, 1921, p. 106.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Three fragments.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Three specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. One specimen. Gear **N 4–T**. Three specimens.

St. 148. 9. i. 27. Off Cape Saunders, South Georgia. From 54° 03′ S, 36° 39′ W to 54° 05′ S, 36° 36′ 30″ W. 132–148 m. Gear **OTL**. Bottom: grey mud and stones. One specimen.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N 76½° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. One specimen.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH**. Bottom: rock. One specimen.

St. 153. 17. i. 27. 54° 08′ 30″ S, 36° 27′ 30″ W. 106 m. Gear **DLH**. Bottom: rock. One specimen.

St. 177. 5. iii. 27. 27 miles SW of Deception Island, South Shetlands. 63° 17′ 30″ S, 61° 17′ 00″ W. 1080 m. Gear **DLH**. Bottom: mud and stones. One fragment.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. One fragment.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH**. Bottom: stones, mud and rock. Three specimens.

REMARKS. Benham, with more material at his disposal, has supplemented Gravier's account of this species. Gravier gives the number of achaetous ante-anal segments as five and Benham as six. There are undoubtedly six glandular rings, as Benham describes, but the hindmost lies up against the anal funnel and may form part of the anal segment. Gravier writes of the anal funnel of his specimen: "L'aspect rappelle de très près ce qu'Arwidsson (1906, Taf. III, fig. 106) a figuré pour le *Leiochone borealis*." The figure to which Gravier refers represents the anal funnel of an *Isocirrus planiceps* and not of a *Leiochone borealis*.

Genus **Asychis**, Kinberg

Asychis amphiglypta (Ehlers).

Maldane amphiglypta, Ehlers, 1897, p. 119, pl. viii, figs. 187–193.
Asychis amphiglypta, Arwidsson, 1911, p. 35, pl. i, figs. 27–31; pl. ii, figs. 55–58.

St. 29. 16. iii. 26. West Cumberland Bay, South Georgia. 5·9 miles S 51° W of Jason Light. 23 m. Gear **DC**. Bottom: mud and stones. One specimen.

St. 30. 16. iii. 26. West Cumberland Bay, South Georgia. 2·8 miles S 24° W of Jason Light. 251 m. Gear **DLH**. Bottom: mud and stones. Sixty-two specimens.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. Two specimens.

St. 186. 16. iii. 27. Fournier Bay, Anvers Island, Palmer Archipelago. 64° 25′ 30″ S, 63° 02′ 00″ W. 295 m. Gear **DLH**. Bottom: mud. Thirty-five specimens.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear **DLH**. Bottom: mud and stones. Eighty specimens.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. Two specimens.

REMARKS. There is little I can add to Ehlers' and Arwidsson's accounts of this species. The largest complete specimen measures 100 mm. by 4 mm. There are 19 chaetigers. The border of the cephalic plate is smooth. The buccal segment is achaetous and ventral hooks are absent from the 1st chaetiger.

The examples are without colour and the glandular areas are not very clearly marked. Both head and hinder ends are well figured by Arwidsson. This author states that there are two to three hinder achaetous segments. This is not substantiated by my specimens, which confirm Ehlers' statement that the anal segment alone is achaetous.

Genus **Nicomache**, Malmgren

Nicomache lumbricalis (Fabricius).

Fauvel, 1927, p. 190, fig. 66 *a–i*.
Nicomache capensis, McIntosh, 1885, p. 399, pl. xlvi, fig. 4; pl. xxiv A, figs. 18–19; pl. xxxvii A, fig. 2.
Nicomache lumbricalis, var. *capensis*, McIntosh, 1904, p. 71, pl. vi, fig. 32.

Saldanha Bay, South Africa. Beach collection. Two specimens.

REMARKS. I am unable to find any distinction between these specimens and European examples of this species. McIntosh (*loc. cit.* 1904) gives the number of chaetigers of his example from the Cape as 20. My complete specimen has 22 chaetigers, as in the European form.

Nicomache sp.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 315 m. Gear **DLH**. Bottom: mud and rock. Three specimens. 93–126 m. Bottom: stones, mud and rock. One specimen.

DESCRIPTION. The largest fragment has eight chaetigers and measures 52 mm. by 4 mm. The head (Fig. 71, *a* and *b*) and the first two chaetigers have a strong reddish brown colour on the dorsal surface, the colour being most intense along the cephalic keel. Otherwise there is no pigmentation.

There is no cephalic border; the prostomium is bluntly rounded and without eye spots. The cephalic keel is well developed, and lies between the nuchal organs: these form a pair of depressions wider in front than behind and diverging from behind forwards; they do not curve round in front as is usual in the genus. Ventrally there is a very large mouth with a folded posterior lip.

The head and buccal segment are equal in length to the 1st chaetiger. The first three chaetigers are all of about the same length, the 4th is shorter than these and the 5th, 6th and 7th are each about equal to the combined lengths of the 2nd and 3rd. These proportions do not hold good for the single specimen from 93–126 m., in which the increase in the length of the segments begins with the 7th chaetiger. The comparative length of the segments must depend on the mode of contraction of the specimen. Pre-chaetal glandular bands occur on the 4th to the 7th chaetigers, and on the 8th the glandular areas are reduced to uncinigerous pads. The feet lie in the anterior third of the segments as far as the 7th chaetiger: the boundary between the 7th and 8th chaetigers is indistinguishable. The first three chaetigers have one to two large untoothed ventral acicular spines.

The dorsal bundle contains bristles of three kinds: stout bordered bristles ending in hirsute tips (Fig. 71, *c*), long, slender, very delicately pennate bristles (Fig. 71, *d*), and simple capillary bristles (Fig. 71, *e*). The ventral hooks (Fig. 71, *f*) have three teeth above the main fang.

In the same bottle with the specimens from 315 m. is a single posterior fragment which probably belongs to this species. It consists of an anal funnel (Fig. 71, *g*) with

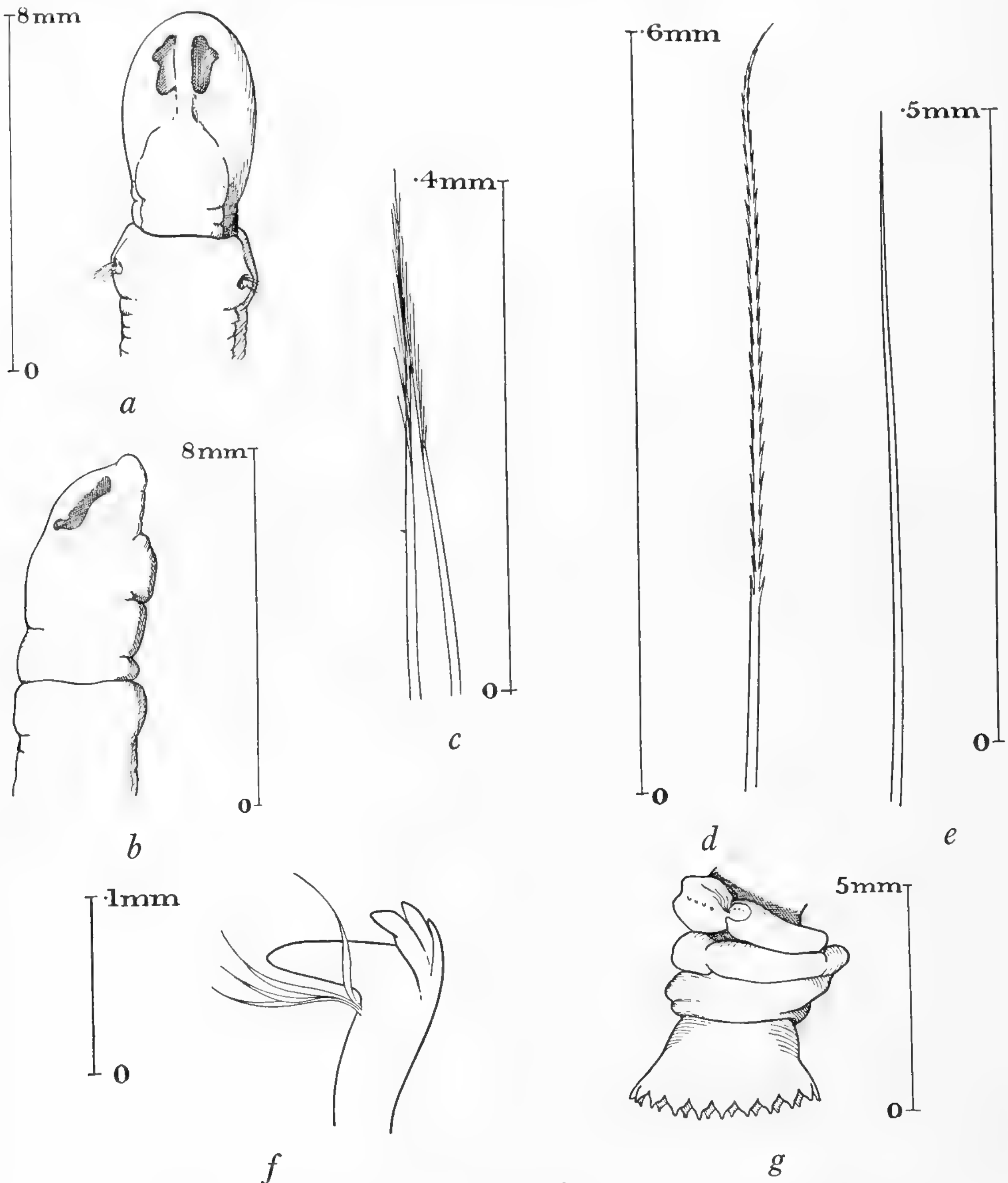


Fig. 71. *Nicomache*, sp.

a. Head seen from above. *b*. Head seen from side. *c*. Stout bordered bristle. *d*. Pennate bristle. *e*. Capillary bristle. *f*. Hook. *g*. Anal funnel.

30 equal cirri and a centrally situated anus, two achaetous ante-anal rings and three posterior chaetigers. In the specimen from 93–126 m. the head, buccal segment and 1st chaetiger are regenerated.

REMARKS. These fragments cannot with certainty be attributed to a genus. They differ from any known Antarctic Maldanid. The head and bristles are close to those of *Nicomache*, to which genus I have provisionally assigned the examples.

Genus **Axiothella**, Verrill

Axiothella antarctica, n.sp.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. Two specimens.

St. WS 76. 11. iii. 27. 51° 00′ 00″ S, 62° 02′ 30″ W. From 51° 00′ 00″ S, 62° 00′ 00″ W to 51° 00′ 00″ S, 62° 04′ 36″ W. 207 m. Gear **DC**. "Taken from sand brought up by conical dredge." Bottom: fine dark sand. One specimen.

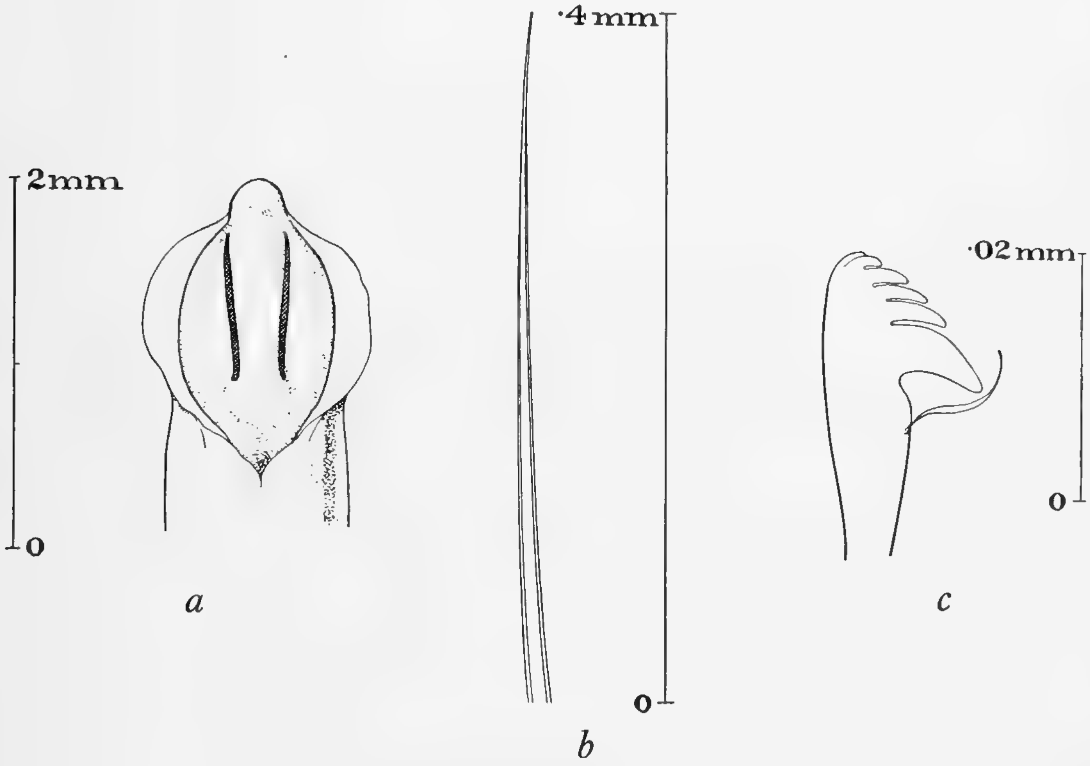


Fig. 72. *Axiothella antarctica*.
a. Head from above. *b*. Dorsal bristle. *c*. Hook.

DESCRIPTION. The largest fragment measures 36 mm. by 1 mm. for eight chaetigers. The colour is an uniform pale green, except for the whitish glandular areas. The head (Fig. 72, *a*) has an oblique cephalic plate with an uninterrupted edge. The prostomium is a small conical structure without eye spots. There is a pair of long parallel nuchal organs set rather far apart.

There is no distinct cephalic keel. There is a long buccal segment about three-quarters the length of the 1st chaetiger. The segments decrease in length to the 4th chaetiger, which is about half the length of the 1st. The 4th to 8th chaetigers are about the same

length, and there remains a damaged fragment of a 9th chaetiger which appears to be longer than the 8th. There are prechaetal glandular bands on the 4th to the 8th chaetigers.

Throughout the fragment the feet remain the same distance from the anterior border of the segments.

The 1st chaetiger has about three ventral uncini, but I cannot with certainty distinguish on these any subrostral barbules. I can see only one kind of dorsal bristle: slender, very thinly bordered capillaries (Fig. 72, *b*). The uncini (Fig. 72, *c*) have five to six teeth above the main fang.

REMARKS. I have created a new species for these few fragments; it is necessarily very imperfectly characterised owing to the poverty of the material. Further material may show that this species is identical with one of the two European representatives of the genus, *A. catenata* (Malmgren) or *A. constricta* (Claparède).

The southern *A. quadrimaculata*, Augener, is a much smaller species with a differently shaped head.

Family OWENIIDAE

Genus **Owenia**, Delle Chiaje

Owenia fusiformis, Delle Chiaje.

Fauvel, 1927, p. 203, fig. 71 *a–f*.

St. WS 4. 30. ix. 26. 32° 45′ 00″ S, 18° 10′ 00″ E. 45–47 m. Gear **DL**. Twenty specimens.

REMARKS. The tube with its incrustation of imbricating sand grains and pieces of shell, the branchial laciniated membrane and the innumerable hooks with two parallel teeth are characteristic of this species.

Family SABELLARIIDAE

Genus **Gunnarea**, Johansson

Gunnarea capensis (Schmarda).

Johansson, 1927, p. 99.
Sabellaria capensis, McIntosh, 1885, p. 418, pl. xxv A, figs. 24–25; pl. xxvi A, figs. 11–12; and 1904, p. 74.
Augener, 1918, p. 493.

Saldanha Bay Beach, South Africa, 1926. Three specimens.

REMARKS. These rather ill-preserved specimens are almost uniformly deep black, except for the golden paleae. Johansson has created the genus *Gunnarea* with this as the type species. He gives the absence of dorsal hooks (*Nacken Haken*) as the generic differential. This is scarcely a character of generic value, but although this form agrees with *Idanthyrsus* in the number of rows of paleae and of parathoracic segments, the complete fusion dorsally of the peduncles to form a single opercular structure with

concentric rows of paleae, and the distinctive broad outer paleae (see McIntosh, *loc. cit.* Pl. XXV A, fig. 24) render it generically distinct from *Idanthyrsus*. To some extent it combines the characters of *Sabellaria* and *Idanthyrsus*.

Genus **Idanthyrsus**, Kinberg

Idanthyrsus armatus, Kinberg.

Pallasia sexungulata, Ehlers, 1897, p. 125, pl. viii, figs. 194–202.
Idanthyrsus armatus, Johansson, 1927, p. 90.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 115 m. Gear **DLH**. Bottom: fine sand. Five specimens.

St. 53. 12. v. 26. Port Stanley, East Falkland Island. Hulk of "Great Britain." 0–2 m. Gear **RM**. Four specimens.

St. WS 72. 5. iii. 27. 51° 07′ 00″ S, 57° 34′ 00″ W. 95 m. Gear **OTC**. Bottom: sand and shell. One specimen.

St. WS 77. 12. iii. 27. 51° 01′ 00″ S, 66° 31′ 30″ W. From 51° 00′ 00″ S, 66° 30′ 00″ W to 51° 02′ 00″ S, 66° 33′ 00″ W. 110–113 m. Gear **OTC**. Bottom: coarse dark sand. One specimen.

St. WS 79. 13. iii. 27. 51° 01′ 30″ S, 64° 59′ 30″ W. From 51° 00′ 00″ S, 65° 00′ 00″ W to 51° 03′ 00″ S, 64° 59′ 00″ W. 132–131 m. Gear **OTC**. Bottom: fine dark sand. "Found attached to large *Molgulidae*." Six specimens.

St. WS 85. 25. iii. 27. 8 miles S 66° E of Lively Island, East Falkland Island. From 52° 09′ 00″ S, 58° 14′ 00″ W to 52° 08′ 00″ S, 58° 09′ 00″ W. 79 m. Gear **OTC**. Bottom: sand and shell. One specimen.

St. WS 88. 6. iv. 27. 54° 00′ 00″ S, 64° 57′ 30″ W. From 54° 00′ 00″ S, 65° 00′ 00″ W to 54° 00′ 00″ S, 64° 55′ 00″ W. 118 m. Gear **OTC**. Bottom: sand, shell and stones. Four specimens.

St. WS 92. 8. iv. 27. 51° 58′ 30″ S, 65° 01′ 00″ W. From 52° 00′ 00″ S, 65° 00′ 00″ W to 51° 57′ 00″ S, 65° 02′ 00″ W. 145–143 m. Gear **OTC**. Bottom: fine dark sand and stones. A cluster of tubes with *Serpulid vermidom* and one specimen.

St. WS 95. 17. iv. 27. 48° 58′ 15″ S, 64° 45′ 00″ W. From 48° 57′ 00″ S, 64° 45′ 00″ W to 48° 59′ 30″ S, 64° 45′ 00″ W. 109 m. Gear **DC**. Bottom: fine dark sand, stones and shell. Two specimens.

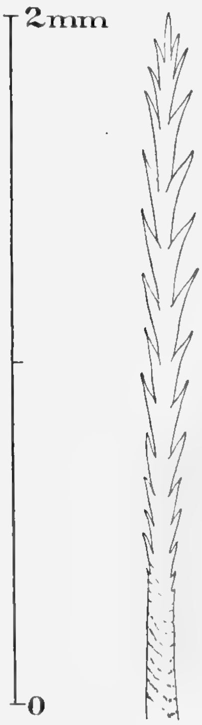


Fig. 73. *Idanthyrsus armatus*. Outer palea.

REMARKS. Ehlers has given a full account of this species. Johansson claims that the outer paleae (Fig. 73) are characteristic. They are certainly distinct from those of the allied *I. pennatus* (Peters) of tropical distribution.

The specimens from St. 53 are very small, measuring 7–10 mm., and I can find only two pairs of dorsal hooks instead of the usual three. Otherwise they do not differ. I take them for young specimens.

The name *Pallasia*, Quatrefages, 1848, retained by Fauvel (1927, p. 206), appears to be preoccupied by *Pallasia*, Desvoidy, 1830, in *Diptera*, and is replaced by *Idanthyrsus*, Kinberg.

Idanthyrsus pennatus (Peters).

Johansson, 1927, p. 88, with synonymy.

St. 2. 17. xi. 25. Clarence Bay, Ascension Island, Catherine's Point and Collyer Point. Shore collection. Four specimens.

REMARKS. I have compared these examples with a number of specimens from the Pacific attributed to this species, and also with the type specimen of McIntosh's *Sabellaria johnstoni*, and I can find no distinction between these Atlantic examples and the Pacific forms. I believe this to be the first record of this species from the Atlantic.

The palm-leaf shaped outer paleae (Fig. 74) are probably characteristic of the species. There is only a single pair of large dorsal hooks. Johansson, writing of the opercular peduncles, says: "Ihr vorderer freier Rand trägt keine Papillen." If he means the peduncular wall just external to the outer paleae, his statement is supported neither by these specimens nor by the Pacific forms examined by me. In all examples this wall has a row of papillae: in old and ill-preserved specimens many of these papillae are often lost.

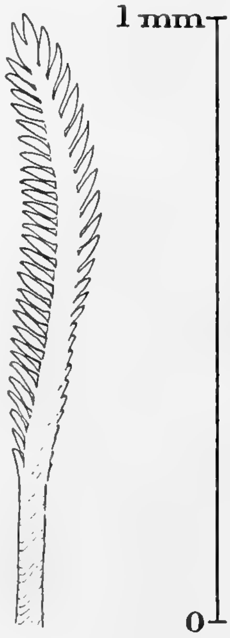


Fig. 74. *Idanthyrsus pennatus*. Outer palea.

Family STERNASPIDAE

Genus **Sternaspis**, Otto

Sternaspis scutata (Ranzani).

Fauvel, 1927, p. 216, fig. 76 *a–g*, with synonymy.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **NCS–T**. Bottom: grey mud. Twelve specimens.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **NCS–T**. Bottom: green mud and sand. Three specimens.

St. 162. 17. ii. 27. Off Signy Island, South Orkneys. 60° 48′ 00″ S, 46° 08′ 00″ W. 320 m. Gear **DLH**. Bottom: green mud. Ninety-five specimens.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. Seventy specimens.

St. 177. 5. iii. 27. 27 miles SW of Deception Island, South Shetlands. 63° 17′ 30″ S, 61° 17′ 00″ W. 1080 m. Gear **DLH**. Bottom: mud and stones. Three specimens.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. Sixty specimens.

St. 182. 14. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 21′ 00″ S, 62° 58′ 00″ W. 278–500 m. Gear **N 4–T**. Bottom: mud. Sixty-five specimens.

St. 187. 18. iii. 27. Neumayr Channel, Palmer Archipelago. 64° 48′ 30″ S, 63° 31′ 30″ W. 259 m. Gear **DLH**. Bottom: mud. One specimen.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 315 m. Gear **DLH**. Bottom: mud and rock. Two specimens.

St. 196. 3. iv. 27. Bransfield Strait, South Shetlands. 62° 17′ 30″ S, 58° 21′ 00″ W. 720 m. Gear **N 70 V**. Bottom: mud and diatomic ooze. Fifteen specimens.

Remarks. I have compared these specimens with some examples from between Iceland and Jan Mayen, and I can find nothing to distinguish the southern from the northern forms. I believe this to be the first record from Antarctic waters.

Sternaspis scutata (Ranzani), var. africana (Augener).

Sternaspis fossor, Stimpson, var. *africana*, Augener, 1918, p. 608, figs. 109 and 110.

St. 274. 4. viii. 27. Off St Paul de Loanda. From 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. 64–65 m. Gear **OTL**. Bottom: grey mud. Fourteen specimens.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo. From 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. 58–67 m. Gear **N 4–T**. Bottom: mud and fine sand. One specimen.

Remarks. The ventral shield is subrectangular with the posterior mid-ventral notch much reduced, the anterior bristles are more slender, numerous (about 20 in a bundle as opposed to 10 or 12, the usual number in *S. scutata*) and closely set than in *S. scutata* (cf. Augener's figs. 109 *a* and *b*, and 110), and eight out of the fifteen examples have an appearance of macroscopic papillation on the posterior segments visible to the naked eye.

These specimens correspond to Augener's account, and I agree that this form differs from the *S. scutata* of European and colder South Atlantic waters, but I cannot follow him in regarding it as a variety of *S. fossor*, Stimpson. I have examined three examples from Massachusetts Bay, labelled *S. fossor*, from the United States National Museum, and except for traces of what appears to be macroscopic papillation round the posterior end they are indistinguishable from the European form. In fact I agree with Fauvel (1927, p. 216) in uniting *S. fossor* with *S. scutata*.

The appearance of macroscopic papillation seems to be due to small, more or less regularly spaced, aggregations of fine particles of mud entangled in tufts of thread-like papillae (*Hautcirren*). I suspect that these groups of particles correspond in position to islands of gland cells secreting a viscous fluid that causes the particles to adhere to the papillae; and I am not satisfied that they represent special concentrations of skin papillae, which appear to be distributed over the skin equally in examples with and without the apparent macroscopic papillation. Anyhow, the fact that this papillation may be present or absent in examples from the same haul renders it of no value as a differential character.

Marenzeller (1890, Pl. i, figs. 4–7) gives comparative figures of the ventral shields of three species of *Sternaspis* and, with Augener, regards the differences in their shape as specific characters. After examining a very large series of Antarctic specimens, I am of the opinion that the shape of the shield varies too much to be of value as a differential. However, on the whole, the shield of these African specimens is more subrectangular

and less notched in the middle posteriorly than the shield of an average Antarctic specimen.

In this relation the shield of these specimens and Augener's figures (109 *d* and *e*) are closer to Marenzeller's figures of the shield of *S. scutata* (*loc. cit.* Fig. 6) than to those of *S. fossor* (Fig. 4). Augener holds the opposite view. Moreover, I am equally of the opinion that the shape of the gill plates and the degree of extension and size of the genital papillae are of little, if any, differential value. There is, however, a substantial distinction in the number and character of the anterior bristles: this is illustrated by Augener.

Regarding the name of this form, if *S. fossor* and *S. scutata* are synonymous, *S. scutata* becomes the stem form and *africana* a variety of this.

Family AMPHICTENIDAE

Genus **Pectinaria**, Lamarck

Pectinaria sp.

St. 4. 30. i. 26. Tristan da Cunha. 36° 55′ 00″ S, 12° 12′ 00″ W. 40–46 m. Gear **DL**. Bottom: stones. One specimen.

REMARKS. The specimen is too much damaged to be assigned with certainty to any species. It is a massive form, measuring as much as 13 mm. in breadth behind the paleae. It is impossible to count the number of bristle-bearing segments. There are 13 paleae in both groups, the tentacular membrane has about 22 processes and the dorsal collar has the same number. There are six anal hooks on each side. The bristles and hooks resemble those figured by McIntosh (1904, Pl. vii, figs. 35 *a*–36) for *Pectinaria capensis*, to which species the present example probably belongs.

Family AMPHARETIDAE

Genus **Amage**, Malmgren

Amage sculpta, Ehlers.

Ehlers, 1908, p. 141, pl. xx, figs. 1–9.
Hessle, 1917, p. 121.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. Seven specimens.

St. 177. 5. iii. 27. 27 miles SW of Deception Island, South Shetlands. 63″ 17′ 30″ S, 61° 17′ 00″ W. 1080 m. Gear **DLH**. Bottom: mud, coarse sand and stones. One specimen.

REMARKS. The average measurements are about 30 mm. by 6 mm. at the widest part. The body is unusually thick and slug-like and tapers very sharply posteriorly. Notopodial bristles are visible externally on 12 segments only, those of the first two chaetigers (3rd and 4th segments according to Hessle's enumeration) being enclosed within the notopodial lobes. The 3rd segment has only two small bristles inside the lobe. The cirri are enormously developed in the hinder region.

The *Amage sculpta* described by Benham (1927, p. 121) from the Ross Sea belongs, in my opinion, to a different species. Benham's examples have a different shape of body, 15 bristle-bearing notopodia and 15 abdominal segments. The bristles of the first two chaetigers are very much more developed than in these specimens and, as Benham has pointed out, the posterior end, with its two long anal cirri and its six segments without neuropods, is quite different from that described by Ehlers. My specimens confirm Ehlers' account.

The deep-water specimen from St. 177 shows certain differences from the rest. It is a small and apparently ripe female, measuring 11 mm. in length. The difference in breadth between the thoracic and abdominal regions is not so marked as in the other specimens. The cephalic lobe is more clearly trilobed, and the raised glandular bands more distinct. The bristles of the first two chaetigers are not enclosed within the pedal lobe, but project freely. They are small but distinct.

In all other respects this example is indistinguishable from the other specimens. The hooks in all the specimens have paired teeth in the third row as figured by Ehlers.

Genus **Melinna**, Malmgren (Hessle char. emend.)

Melinna cristata (M. Sars).

Fauvel, 1927, p. 237, fig. 83 *i–n*.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. One specimen.

REMARKS. A single, rather poorly preserved specimen, which I believe to belong to this species. Ehlers (1908, p. 144) has already recorded it from southern waters, near Bouvet Island.

Genus **Phyllocomus**, Grube

Phyllocomus crocea, Grube.

McIntosh, 1885, p. 427, pl. xlvii, fig. 11; pl. xxvi A, fig. 25; pl. xxxvii A, fig. 6.
Hessle, 1917, p. 123.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. Five specimens.

St. WS 80. 14. iii. 27. 50° 57′ 00″ S, 63° 37′ 30″ W. From 50° 58′ 00″ S, 63° 39′ 00″ W to 50° 55′ 30″ S, 63° 36′ 00″ W. 152–156 m. Gear **OTC**. Bottom: fine dark sand. One specimen.

REMARKS. There is not much that I can add to Hessle's diagnosis of this species. The examples from St. 175 have an average measurement of 30 mm. by 4 mm. at the widest part; a damaged example from St. WS 80, doubtfully attributable to this species, is very much larger, measuring 83 mm. in length. The large, rounded prostomium (Fig. 75, *a*) is splashed with dark red pigment, which extends in irregular markings to the under-surface of the buccal segment, and along the back to about the 5th chaetiger.

Hessle does not call attention to the unusual nature of the gills: they are described by Grube as "foliaceae, quasi lanceolatae"; and instead of being of the normal cirriform shape they are flattened and leaf-like for about three-fourths of their length, and end in a rounded cirriform tip. The gills (Fig. 75, *b*) are arranged in two transverse series of three on each side, with the 4th directly in front of the innermost of the series.

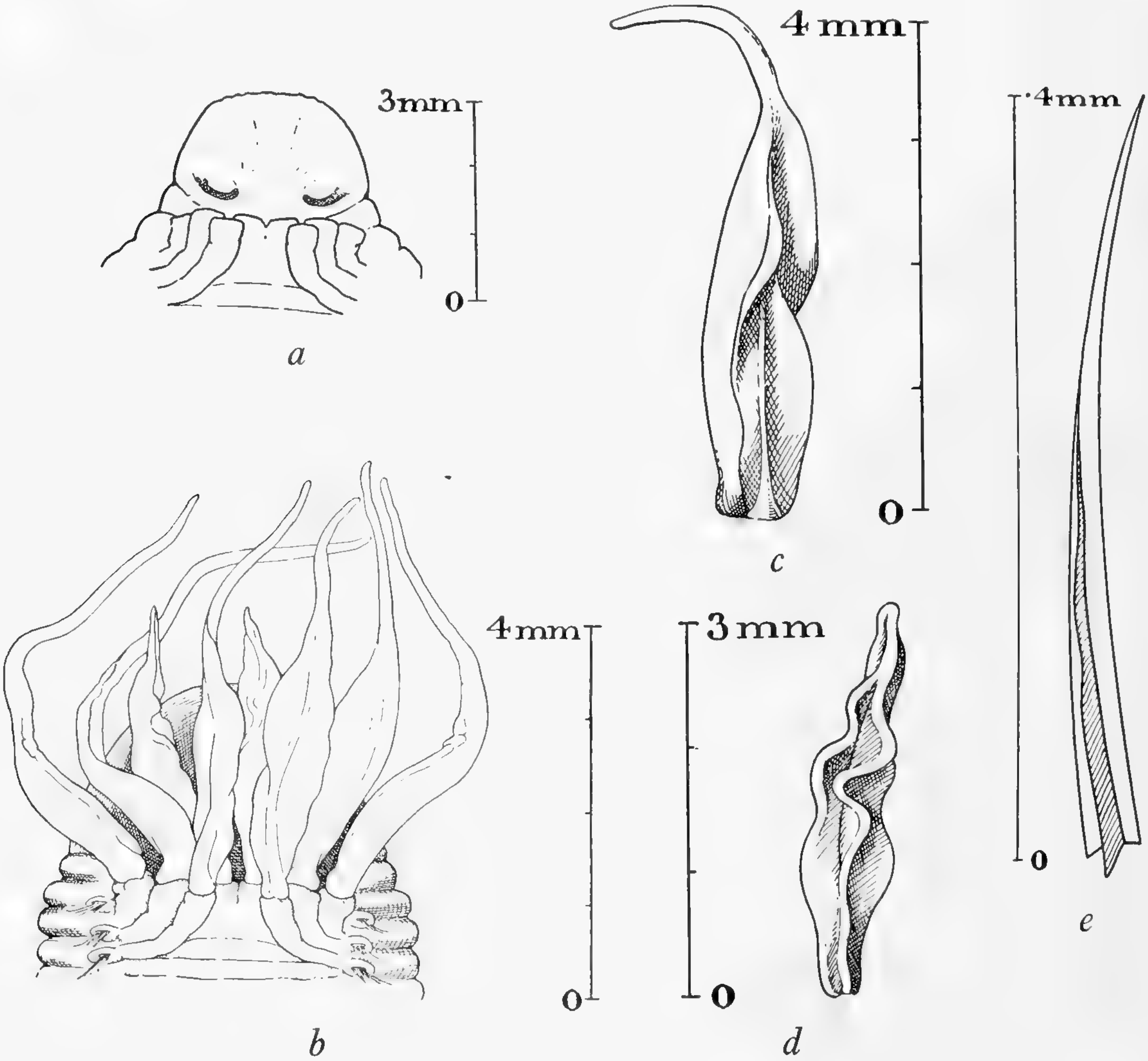


Fig. 75. *Phyllocomus crocea.*

a. Prostomium. *b.* Anterior end with gills. *c.* Posterior member of inner pair of gills on each side. *d.* Anterior member of inner pair of gills on each side. *e.* Dorsal bristle.

Those of the outer pair on each side consist of two membranes, one on each side of a rounded central axis. The posterior member of the inner pair (Fig. 75, *c*) on each side has, in addition to its two membranes separated by the axis, a second, smaller pair of membranes coming off from the axis and extending for about half its length. The anterior member of the inner pair (Fig. 75, *d*) on each side is shorter than the rest and lacks the rounded cirriform tip; it has four membranes, springing from the main axis

and continued over its entire length. This condition is exactly similar to that described by Benham (1921, p. 98) for the gill of his *P. dibranchiata*. Moreover, there are three tubular ducts running down from the bases of the gills to the notopods. That from the outermost gill runs to the 1st chaetiger, that from the second gill to the 2nd chaetiger, and that from the hindmost of the inner pair on each side to the 3rd chaetiger. The anterior member of the inner pair on each side has no duct visible externally. The condition is as if the ceratophores of the gills were fused to the back as they ran outwards towards the notopods.

In Benham's account of *P. dibranchiata* he describes analogous ducts as channels open near the gill base, and roofed over on their way to the notopods. In this they differ from those of the present species, in which the "channels" are closed tubes throughout. These ducts are the "areolae" of Grube.

This species is clearly distinct from Benham's *P. dibranchiata*, which has a single pair of gills, each with four membranes. Benham is mistaken in saying that Grube ascribes two pairs of gills to *P. crocea*, for Grube writes: "Branchiae utrinque 4 dorsuales."

The dorsal bristles (Fig. 75, *e*) correspond exactly to those described by Benham for *P. dibranchiata*. They all have the curious third flange which Benham describes and figures. The hooks are well figured by McIntosh.

Genus **Neosabellides**, Hessle

Neosabellides elongatus (Ehlers).

Sabellides elongatus, Ehlers, 1913, p. 551, pl. xlii, figs. 1–6.
Neosabellides elongatus, Hessle, 1917, p. 104.
Benham, 1927, p. 117, pl. iii, figs. 82–86.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. One specimen.

St. 159. 21. i. 27. 53° 52′ 30″ S, 36° 08′ 00″ W. 160 m. Gear **DLH**. Bottom: rock. One specimen.

Remarks. From these indifferently preserved specimens, I can add nothing to the already existing accounts of this species.

Genus **Amphicteis**, Grube

Amphicteis gunneri (M. Sars).

Fauvel, 1927, p. 231, fig. 80 *a–k*.

St. 91. 8. ix. 26. ·5 mile off Roman Rock, False Bay, South Africa. 35 m. Gear **NRL**. Bottom: sand. One specimen.

Remarks. The specimen is poorly preserved, and does not permit a thorough examination. It seems to be inseparable from this widely distributed species. There

are, however, only three pairs of gills, and I presume that the fourth has been lost, although I cannot see the usual scar marking the position of a lost gill. I believe this to be the first record of this species from South Africa.

Amphicteis gunneri (M. Sars), var. antarctica, Hessle.

Hessle, 1917, p. 116, text-fig. 21.

St. 28. 16. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 45° W of Jason Light. 168 m. Gear **DC**. Bottom: mud. One specimen.

St. 30. 16. iii. 26. West Cumberland Bay, South Georgia. 2·8 miles S 24° W of Jason Light. 251 m. Gear **DLH**. Bottom: mud and stones. Two specimens.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 143. 30. xii. 26. Off mouth of East Cumberland Bay, South Georgia. 54° 12′ S, 36° 29′ 30″ W. 273 m. Gear **OTL**. Bottom: mud. One specimen.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH**. Bottom: rock. Two specimens.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stones and rock. Four specimens.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. Twelve specimens.

St. 182. 14. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 21′ 00″ S, 62° 58′ 00″ W. 278–500 m. Gear **N 7–T**. Bottom: mud. Two specimens.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Bottom: mud and stones. Gear **OTM**. Three specimens. Gear **DLH**. Four specimens.

St. WS 32. xii. 12. 26. Mouth of Drygalski Fiord, South Georgia. 225 m. Gear **BTS**. Bottom: grey mud. Five specimens.

St. MS 15. 17. ii. 25. East Cumberland Bay, South Georgia. 3 miles SW of Merton Rock to 2¼ miles NNW of Dartmouth Point. 110 m. Gear **DS**. One specimen.

St. MS 69. 5. iii. 26. East Cumberland Bay, South Georgia. 1½ cables E × N to 8½ cables E × N of Macmahon Rock. 146 m. Gear **DS**. Five specimens.

REMARKS. This species is abundant round South Georgia. In the smaller and presumably younger specimens, the type of palea with a kind of plume on the top, which Hessle regards as a varietal character, is replaced by a more slender and gradually tapering kind such as is found in the stem form. The examples from Sts. 160 and 182 have the posterior raised border of the nuchal organs conspicuously coloured brown: in some from St. 167 there are faint traces of this pigmentation; but in the majority of examples it is completely absent. Unfortunately the type specimens of McIntosh's *A. wyvillei* and *A. sarsi* are too ill-preserved to be of use for purposes of comparison.

? Amphicteis gunneri (M. Sars), var. **japonica** (McIntosh).

Amphicteis japonica, McIntosh, 1885, p. 431, pl. xxvii A, figs. 3–5.
Amphicteis gunneri, var. *japonica*, Hessle, 1917, p. 117.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo. From 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. 58–67 m. Gear **OTL**. Bottom: mud and fine sand. One specimen.

REMARKS. A single specimen, measuring 21 mm. by 2 mm. The paleae are indistinguishable from those of the northern form, and in this they agree with those of Hessle's Japanese specimens rather than McIntosh's. In fact, as Hessle points out, the only difference between this form and the northern is that the hooks have an extra tooth. Those of my specimen correspond exactly to McIntosh's figure. On distributional grounds I had much hesitation in assigning this form to the Japanese variety, but an *A. gunneri* with an extra tooth to its hooks seems to be an exact account of this form.

Family TEREBELLIDAE

Sub-family *AMPHITRITINAE*, Malmgren

Genus **Terebella**, Linnaeus

Terebella ehlersi, Gravier.

Gravier, 1907, p. 47, pl. v, figs. 45–46, text-figs. 30–31.
Hessle, 1917, p. 190.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Seven specimens.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N $76\frac{1}{2}$° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. Six specimens.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH** and **NRL**. Bottom: stones, mud and rock. Two specimens.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S $\frac{1}{2}$ E to $8\frac{1}{2}$ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. Six specimens.

REMARKS. St. 149 yielded a large specimen measuring 145 mm. in length without the tentacles. This is considerably longer than any previous record. Hessle claims that this species has eye spots. With Gravier I cannot see these. The species is distinguished by its twisted and denticulated dorsal bristles.

Genus **Loimia**, Malmgren

Loimia medusa (Savigny).

Fauvel, 1902, p. 94, text-figs. 43–45.
Hessle, 1917, p. 170, for synonymy.

St. 1. 16. xi. 25. Clarence Bay, Ascension Island. 7° 55′ 15″ S, 14° 25′ 00″ W. 16–27 m. Gear **NRM**. Bottom: coral, sand and shell. Six specimens.

REMARKS. All these examples are in poor condition. The largest measures 28 mm. by 2 mm. at the widest part. Some have four teeth only in the hooks of the biserial thoracic tori and five teeth in the abdominal hooks: in others there is a small 5th tooth apically in the hooks of the biserial thoracic tori and a 6th tooth in the abdominal hooks. Willey (1905, pp. 302–304) separates *L. medusa* from *L. variegata* (Grube) on the ground that the former species has four teeth only in the hooks of the biserial thoracic tori and five in the abdominal hooks, and *L. variegata* has an additional tooth in the thoracic and abdominal hooks respectively. In view of the variation in the number of uncinal teeth in the present examples, I cannot believe that this alone constitutes a specific distinction. Grube, however, states that *L. medusa* and *L. variegata* are differently coloured. Fauvel (*loc. cit.*) figures four to five uncinal teeth for his *L. medusa* and Augener (1918, p. 540) records five to six uncinal teeth.

In the biserial tori the hooks are set back to back. The present material is unsuitable for an accurate estimate of the number of gland shields, but there appear to be about eleven. *L. montagui* has about eight scutes.

Loimia montagui (Grube).

Willey, 1905, p. 303, pl. vi, figs. 160–163, with synonymy.

St. 270. 27. vii. 27. 13° 58′ 30″ S, 11° 43′ 30″ E. 200 (–0) m. Gear **TYF**. Two specimens. 126 (–0) m. Gear **N 100 B**. One specimen.

REMARKS. The largest specimen measures 15 mm. by 2 mm. As in *L. medusa* the 2nd segment sends forward two large foliaceous lobes that fuse in the mid-ventral line. The 3rd segment has a pair of thick triangular lateral lobes. There are eight ventral gland shields. The biserial thoracic tori have the hooks set back to back. The thoracic hooks have six teeth and the abdominal seven teeth. On each side above the notopods is a white glandular tract, extending from the gill region to the 8th chaetiger. It probably corresponds to the path of the large tube joining the nephridia.

Both Fauvel and Augener have recorded *L. medusa* from tropical West Africa. *L. montagui* is easily distinguished by the larger number of teeth to the hooks. I believe this to be the first record of this tropical species from Atlantic waters. I suspect, however, some error in the locality label, for this indicates that these specimens were pelagic. Many Terebellids have pelagic larvae, but the present examples are small but not larval, being in all respects fully formed, and I am unable to account for their presence among the plankton.

Genus **Pista**, Malmgren

Pista mirabilis, McIntosh.

McIntosh, 1885, p. 454, pl. li, figs. 1 and 2; pl. xxvii A, fig. 34.
Scione mirabilis, Benham, 1921, p. 85, pl. ix, figs. 97–100.
Pista mirabilis, Benham, 1927, p. 99, with synonymy.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m. Gear **DLH**. Bottom: rock. Five specimens.

REMARKS. The largest specimen measures 76 mm. by 4 mm. There are several tubes with the characteristic lateral projections. In my opinion Benham (1921, Pl. ix, figs. 97, 98), in his figures drawn to show the arrangement of the lateral lobes, greatly exaggerates the size of the lobe below the 1st notopod. I find the lobe of the 3rd segment larger and more rounded than he shows it, and that of the 4th segment or 1st chaetiger only very slightly developed. I give a figure of the modified hooks (Fig. 76) of the 1st thoracic torus. I have nothing further to add to the numerous accounts of this species and its tube.

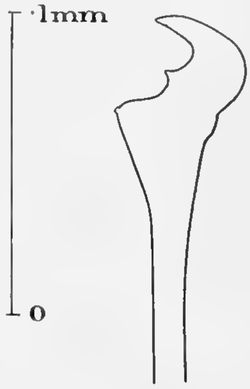


Fig. 76. *Pista mirabilis.* Hook of 1st thoracic torus.

Pista corrientis, McIntosh.

McIntosh, 1885, p. 457, pl. xlviii, fig. 11; pl. xxvii A, fig. 35.
Hessle, 1917, p. 158, pl. ii, figs. 2 and 3.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear OTL. Bottom: fine sand. One specimen.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear OTM. Bottom: mud and stones. ? Two specimens.

REMARKS. Of these specimens only that from St. 51 is suitable for detailed examination. It measures 20 mm. by 2 mm. The cephalic lobe is completely concealed at the sides by the greatly developed lateral flaps of the buccal segment. The 3rd segment has also well-developed lateral processes. The 1st pair of gills (Fig. 77, *a*) has a long stalk and is richly branched at the apex. The 2nd pair is about two-thirds the size of the first. Small nephridial papillae are visible at the sides of the 3rd and 4th notopods (6th and 7th segments). The dorsal bristles have wide wings (Fig. 77, *b*) and the anterior hooks are well figured by McIntosh. I give a figure of a hook (Fig. 77, *c*) from a biserial thoracic torus, in which the posterior prolongation is absent. I find this species difficult to separate from *Pista symbranchiata* (Ehlers).

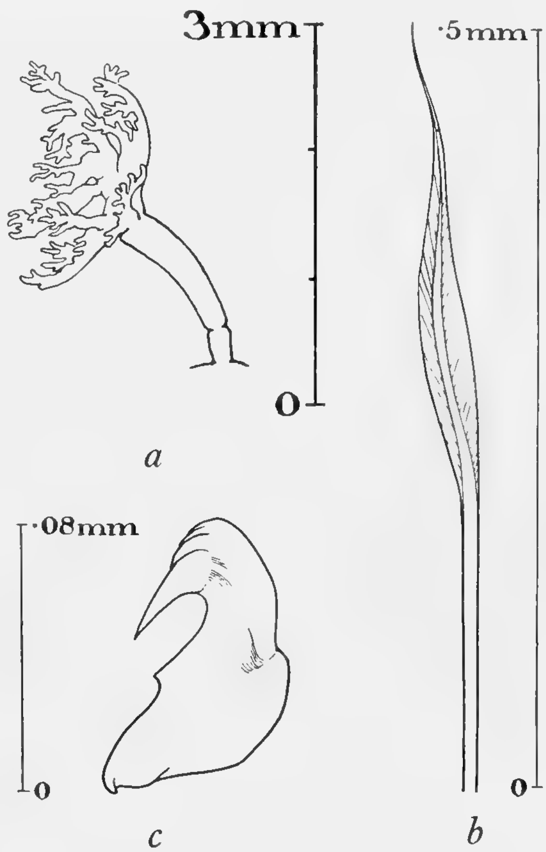


Fig. 77. *Pista corrientis.*

a. Gill. *b.* Dorsal bristle. *c.* Hook from biserial thoracic torus.

Leaena abranchiata, Ehlers, var. **antarctica** (McIntosh).

Hessle, 1917, p. 197.
Benham, 1927, p. 106.
Leaena antarctica, McIntosh, 1885, p. 462, pl. xlviii, figs. 9 and 10; pl. xxviii A, figs. 10 and 11.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Six specimens.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. Five specimens.

REMARKS. These specimens have 10 notopods and winged dorsal bristles. Benham gives 11 notopods for his specimens from McMurdo Sound. The dorsal collar of the 3rd segment is very little developed.

Leaena collaris, Hessle.

Hessle, 1917, p. 198, pl. ii, figs. 9 and 10, text-fig. 52 *a–c*.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. One specimen.

REMARKS. This specimen corresponds closely to Hessle's description and figures. I should describe the characteristic dorsal collar of the 3rd segment as being crenellated rather than divided into four lobes, as Hessle describes it. The specimen measures 30 mm. by 3 mm.

Genus **Neoleprea**, Hessle

Neoleprea streptochaeta (Ehlers).

Leprea streptochaeta, Ehlers, 1897, p. 130, pl. viii, figs. 203–205.
Neoleprea streptochaeta, Hessle, 1917, p. 192.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. Four specimens.

REMARKS. This species is characterised by the twisted geniculate dorsal bristles. Ehlers gives a full account of it.

Genus **Lanicides**, Hessle

Lanicides vayssieri (Gravier).

Terebella (*Phyzelia*) *vayssieri*, Gravier, 1911, pl. x, figs. 121–123; pl. xi, figs. 134–135.
Lanicides vayssieri, Hessle, 1917, p. 166.
Benham, 1921, p. 83.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Two specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear BTS. Bottom: mud and sand. One specimen.

St. MS 14. 17. ii. 25. From 1·5 miles SE × S to 1·5 miles S $\frac{1}{2}$ W of Sappho Point, East Cumberland Bay, South Georgia. 190–110 m. Gear DS. One specimen, ? young.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. $9\frac{1}{4}$ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear BTS. Six specimens.

REMARKS. The example from St. 45 is very large, measuring 115 mm. without the tentacles for about 110 segments. The 3rd segment has a large lateral lobe: the 1st notopod is on the 4th segment and the 1st neuropod on the 5th. The example from St. 45 has the double rows of hooks beginning on the 10th segment on one side and the 11th on the other: they continue to the 20th segment. There are large nephridial papillae on the 6th and 7th segments. Hessle and Benham have corrected certain misapprehensions in Gravier's original account, but I cannot follow Hessle when he writes of the dorsal bristles "in ihren oberen Teilen ruderförmig erweitert und hier mässig gesäumt." The dorsal bristles (Fig. 78) in these specimens are slender and narrowly bordered, as Gravier describes and figures them.

Fig. 78. *Lanicides vayssieri.* Dorsal bristle.

Genus **Amphitrite**, O. F. Müller

Amphitrite kerguelensis, McIntosh.

Hessle, 1917, p. 186, with synonymy.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear DL. Bottom: mud and rock. Two specimens.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear OTM. Bottom: mud and stones. One specimen.

St. WS 99. 19. iv. 27. 49° 42′ 00″ S, 59° 14′ 30″ W. From 49° 41′ 00″ S, 59° 14′ 00″ W to 49° 43′ 00″ S, 59° 15′ 00″ W. 251–225 m. Gear OTC. Bottom: fine dark sand. One specimen.

REMARKS. This species is characterised by the high dorsal collar on the 4th segment to which the posterior pair of gills is attached.

Amphitrite edwardsi (Quatrefages).

Fauvel, 1927, p. 245, fig. 84 *a–i*.

St. WS 80. 14. iii. 27. 50° 57′ 00″ S, 63° 37′ 30″ W. From 50° 58′ 00″ S, 63° 39′ 00″ W to 50° 55′ 30″ S, 63° 36′ 00″ W. 152–156 m. Gear OTC. Bottom: fine dark sand. One specimen.

St. WS 81. 19. iii. 27. 8 miles N 11° W of North Island, West Falkland Island. From 51° 30′ 00″ S, 61° 15′ 00″ W to 51° 30′ 30″ S, 61° 10′ 00″ W. 81–82 m. Gear OTC. Two specimens.

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. From 49° 00′ 00″ S, 62° 00′ 00″ W to 49° 01′ 00″ S, 61° 56′ 00″ W. 146–145 m. Gear OTC. Bottom: sand, gravel and stones. Four specimens.

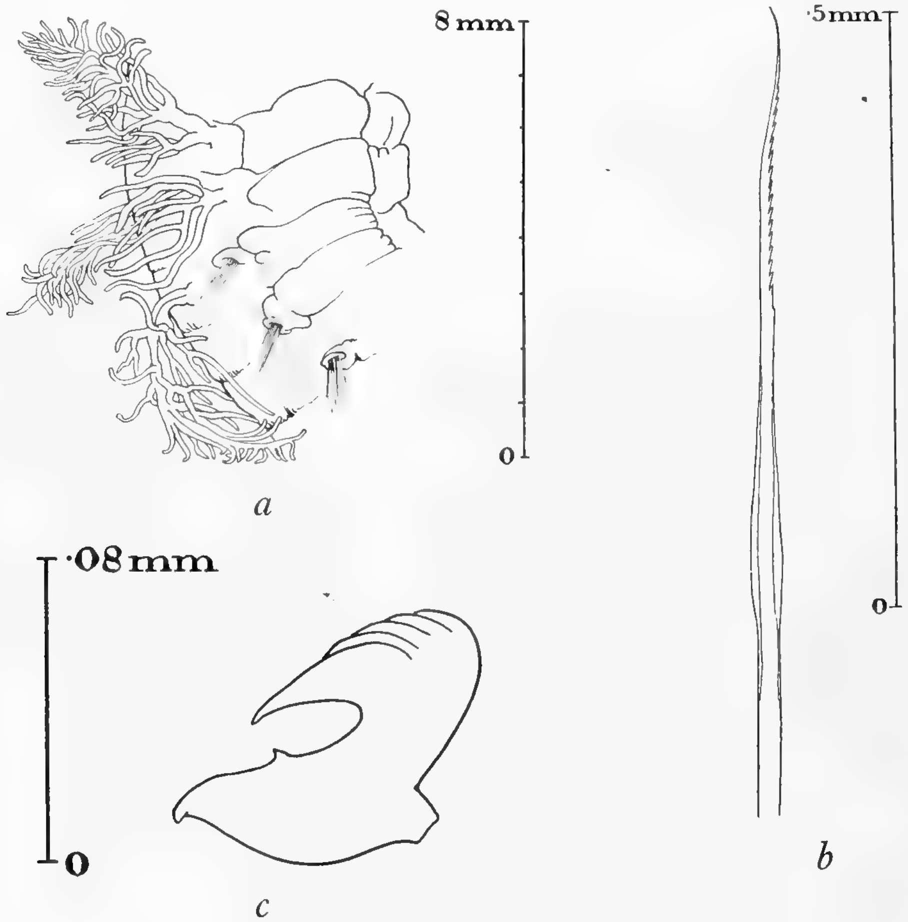


Fig. 79. *Amphitrite edwardsi.*

a. Gills of right side seen from below and from the side. *b.* Dorsal bristle. *c.* Thoracic hook.

Remarks. The largest specimen measures 45 mm. by 6 mm. for 48 chaetigers. It is incomplete posteriorly. The thorax is thick and dorsally arched. There are no eye spots. There are large lateral flaps on the 2nd and 3rd segments and a small one on the 4th. There are 11 ventral gland shields. Each of the three pairs of gills (Fig. 79, *a*) consists of a pair of stout and richly branched trunks. The nephridia extend from the 3rd to the 12th segments. There are 17 thoracic notopods. The dorsal bristles have distinct borders and a long denticulated apex (Fig. 79, *b*). The double rows of hooks (Fig. 79, *c*) extend from the 7th to the 16th uncinigers. The hooks have about six rows of teeth above the main fang. Posteriorly the abdominal tori are gradually transformed into narrow pinnules.

I have compared these specimens with some examples from St Vaast named by Fauvel and, except in the matter of size and in the fact that in the European specimens the nephridia extend from the 3rd to the 11th segments, while in the southern examples

they extend from the 3rd to the 12th segments, I can find nothing to distinguish them. The tube is a plain structure with walls of mud.

This species would fall within Hessle's genus *Neoamphitrite*, which Fauvel rejects.

Genus **Nicolea**, Malmgren

Nicolea chilensis (Schmarda).

Hessle, 1917, p. 172.

St. 4. 30. i. 26. Tristan da Cunha. 36° 55′ 00″ S, 12° 12′ 00″ W. 40–46 m. Gear **DL**. Bottom: stones. Fifty-two specimens.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. Two specimens.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. Twenty specimens.

St. WS 84. 24. iii. 27. $7\frac{1}{2}$ miles S 9° W of Sea Lion Island, East Falkland Island. From 52° 33′ 00″ S, 59° 08′ 00″ W to 52° 34′ 30″ S, 59° 11′ 00″ W. 75–74 m. Gear **OTC**. Bottom: coarse sand, shell and stones. Two specimens.

St. WS 88. 6. iv. 27. 54° 00′ 00″ S, 64° 57′ 30″ W. From 54° 00′ 00″ S, 65° 00′ 00″ W to 54° 00′ 00″ S, 64° 55′ 00″ W. 118 m. Gear **OTC**. Bottom: sand, shell and stones. Sixteen specimens.

Remarks. These specimens have 18 notopods and 16 to 17 gland shields. A specimen from St. WS 88 measures 70 mm. by 5 mm. for 68 segments. The examples from Tristan da Cunha are small, varying between 31 mm. in length and 4 mm., with only four abdominal segments. The majority of specimens from St. 58 are young, with an average length of about 10 mm. In young specimens, the second pair of gills is only very slightly developed.

Nicolea macrobranchia (Schmarda).

Augener, 1918, p. 527, pl. vii, figs. 232–233, text-fig. 89, with synonymy.

St. MS 82. 6. ix. 26. Off Salamander Point, Saldanha Bay, South Africa. 7–14 m. Gear **BTS**. Two specimens.

Remarks. Of these examples one measures 29 mm. without the tentacles and has 34 bristle-bearing notopods; the other measures 24 mm. and has 25 bristle-bearing notopods. Behind the 25th notopod the body is regenerating.

Sub-family *ARTACAMINAE*

Genus **Artacama**, Malmgren

Artacama proboscidea, Malmgren.

Hessle, 1917, p. 194, with synonymy.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Nine specimens.

St. 30. 16. iii. 26. West Cumberland Bay, South Georgia. 2·8 miles S 24° W of Jason Light. 251 m. Gear **DLH**. Bottom: mud and stones. Two specimens.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **NCS–T**. Bottom: green mud and sand. One specimen.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear **BTS**. Bottom: mud and sand. One specimen.

REMARKS. The largest example measures 82 mm. by 6 mm. The appearance of the abdominal segments varies much with the degree of contraction of their cirri.

Sub-family *THELEPINAE*, Hessle

Genus **Thelepus**, Leuckart

Thelepus cincinnatus (Fabricius).

Fauvel, 1927, p. 271, fig. 95 *i–m*.
Hessle, 1917, p. 212.
Benham, 1927, p. 111.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Twenty specimens, with numerous tubes, mud and debris.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **OTL**. Bottom: grey mud. Five specimens.

St. 42. 1. iv. 26. Off mouth of Cumberland Bay, South Georgia. From 6·3 miles N 89° E of Jason Light to 4 miles N 39° E of Jason Light. 120–204 m. Gear **OTL**. Bottom: mud. Eighteen specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Twenty specimens.

St. 123. 15. xii. 26. Off mouth of Cumberland Bay, South Georgia. From 4·1 miles N 54° E of Larsen Point to 1·2 miles S 62° W of Merton Rock. 230–250 m. Gear **OTL**. Bottom: grey mud. Thirteen specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. Five specimens.

St. 148. 9. i. 27. Off Cape Saunders, South Georgia. From 54° 03′ S, 36° 39′ W to 54° 05′ S, 36° 36′ 30″ W. 132–148 m. Gear **OTL**. Bottom: grey mud and stones. Five specimens.

St. 149. 10. i. 27. Mouth of East Cumberland Bay, South Georgia. From 1·15 miles N 76½° W to 2·62 miles S 11° W of Merton Rock. 200–234 m. Gear **OTL**. Bottom: mud. Eleven specimens.

St. 152. 17. i. 27. 53° 51′ 30″ S, 36° 18′ 30″ W. 245 m. Gear **DLH**. Bottom: rock. Ten specimens.

St. 159. 21. i. 27. 53° 52′ 30″ S, 36° 08′ 00″ W. 160 m. Gear **DLH**. Bottom: rock. Nine specimens.

St. 163. 17. ii. 27. Paul Harbour, Signy Island, South Orkneys. 18–27 m. Gear **BTS**. One specimen.

St. 187. 18. iii. 27. Neumayr Channel, Palmer Archipelago. 64° 48′ 30″ S, 63° 31′ 30″ W. 259 m. Gear **DLH**. Bottom: mud. Two specimens.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear **OTM**. Bottom: mud and stones. One specimen.

St. WS 27. 19. xii. 26. 53° 55′ 00″ S, 38° 01′ 00″ W. 107 m. Gear **N 100 H**. (Net touched bottom.) Bottom: gravel. Two specimens.

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. From 49° 00′ 00″ S, 62° 00′ 00″ W to 49° 01′ 00″ S, 61° 56′ 00″ W. 146–145 m. Gear **OTC**. Bottom: sand, gravel, stones. Two specimens.

St. MS 14. 17. ii. 25. From 1·5 miles SE × S to 1·5 miles S ½ W of Sappho Point, East Cumberland Bay, South Georgia. 190–110 m. Gear **DS**. Fifteen specimens, with numerous tubes, mud and debris.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. One specimen.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. 9¼ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **BTS**. One specimen.

REMARKS. An example from St. MS 68 measures 190 mm. for about 105 segments. Only the last 23 segments are without notopods. I believe that in the southern forms belonging to this species the gills more nearly meet in the mid-dorsal line than in the northern forms. In some examples there is only the width of about two gills separating the tufts of branchiae.

Thelepus setosus (Quatrefages).

Fauvel, 1927, p. 273, fig. 95 *a–h*, with synonymy.
Thelepus plagiostoma, Hessle, 1917, p. 214.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. Four specimens.

St. 53. 12. v. 26. Port Stanley, East Falkland Island. Hulk of "Great Britain." 0–2 m. Gear **RM**. Two specimens.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. Two specimens.

St. WS 25. 17. xii. 26. Undine Harbour (North), South Georgia. 18–27 m. Gear **BTS**. Bottom: mud and sand. One specimen.

St. WS 56. 14. i. 27. Larsen Harbour, Drygalski Fiord, South Georgia. 2 m. Gear **NH**. Off kelp root. Eight specimens.

St. WS 65. 22. i. 27. Undine Harbour (North), South Georgia. From kelp root. One specimen.

St. WS 73. 6. iii. 27. 51° 01′ 00″ S, 58° 54′ 00″ W. From 51° 02′ 00″ S, 58° 55′ 00″ W to 51° 00′ 00″ S, 58° 53′ 00″ W. 121–130 m. Gear **OTC**. Bottom: fine dark sand. Two specimens.

St. WS 79. 13. iii. 27. 51° 01′ 30″ S, 64° 59′ 30″ W. From 51° 00′ 00″ S, 65° 00′ 00″ W to 51° 03′ 00″ S, 64° 59′ 00″ W. 132–131 m. Gear **OTC**. Bottom: fine dark sand. One specimen.

St. WS 90. 7. iv. 27. 13 miles N 83° E of Cape Virgins Light, Argentine Republic. From 52° 18′ 00″ S, 68° 00′ 00″ W to 52° 19′ 30″ S, 67° 57′ 00″ W. 82–81 m. Gear **OTC**. Bottom: fine dark sand. Two specimens.

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. From 49° 00′ 00″ S, 62° 00′ 00″ W to 49° 01′ 00″ S, 61° 56′ 00″ W. 146–145 m. Gear **OTC**. Bottom: sand, gravel and stones. One specimen.

13. iv. 25. East Cumberland Bay, South Georgia. Two specimens.

REMARKS. I have nothing to add to Fauvel's (1916, pp. 466–471) exhaustive discussion of this species.

Sub-family *POLYCIRRINAE*, Malmgren

Genus **Polycirrus**, Grube

Polycirrus kerguelensis (McIntosh).

Hessle, 1917, p. 221.
Ereutho kerguelensis, McIntosh, 1885, p. 474, pl. xxviii A, figs. 20–21.
Polycirrus kerguelensis, Gravier, 1911, p. 141, pl. xi, fig. 136.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 42. 1. iv. 26. Off mouth of Cumberland Bay, South Georgia. From 6·3 miles N 89° E of Jason Light to 4 miles N 39° E of Jason Light. 120–204 m. Gear **OTL**. Bottom: mud. Two specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Four specimens.

St. 144. 5. i. 27. Off mouth of Stromness Harbour, South Georgia. From 54° 04′ S, 36° 27′ W to 53° 58′ S, 36° 26′ W. 155–178 m. Gear **NCS–T**. Bottom: green mud and sand. One specimen.

St. 148. 9. i. 27. Off Cape Saunders, South Georgia. From 54° 03′ S, 36° 39′ W to 54° 05′ S, 36° 36′ 30″ W. 132–148 m. Gear **OTL**. Bottom: grey mud and stones. One specimen.

REMARKS. All these examples have 11 notopods and the neuropods begin behind the last notopod. The dorsal bristles are winged. In the present collection there are several ripe males with very large nephridial papillae on the 4th, 5th and 6th chaetigers.

Polycirrus hamiltoni, Benham.

Benham, 1921, p. 94, pl. ix, figs. 101–106.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. 105–115 m. Gear **OTL**. Bottom: fine sand. Four specimens.

St. 52. 5. v. 26. Port William, East Falkland Island. 7·4 cables N 17° E of Navy Point. 17 m. Gear **LH**. Three specimens.

REMARKS. All specimens are in poor condition. They agree in the main with Benham's account. The average size is 20 mm. by 2 mm. There are between 30 and 40 notopods. The neuropods begin at about the 13th chaetiger. Benham gives 13 pairs of gland shields: my specimens show only 11 clearly defined pairs. Benham states that there is a small nephridial papilla below each of the first eight notopods. These I do not see, but as far as can be gathered from dissection of this inadequate material there are six pairs of nephridia of equal size occupying the first six chaetigers. If, as I suspect, the 1st notopod occurs on the 3rd segment, this arrangement of the nephridia would correspond to that found in all the other species of *Polycirrus* with more than three pairs of nephridia. It is, however, impossible to determine externally the limits of the first three segments.

As Benham states, there are two kinds of dorsal bristle, a larger kind (Fig. 80, *a*) with one edge clearly denticulated, and a smaller kind (Fig. 80, *b*) with a row of minute teeth on both edges. The hooks (Fig. 80, *c*) correspond to Benham's description, except that he omits to mention the very distinct striae on the body of the hook.

I believe the smaller type of toothed dorsal bristle to be characteristic of this species.

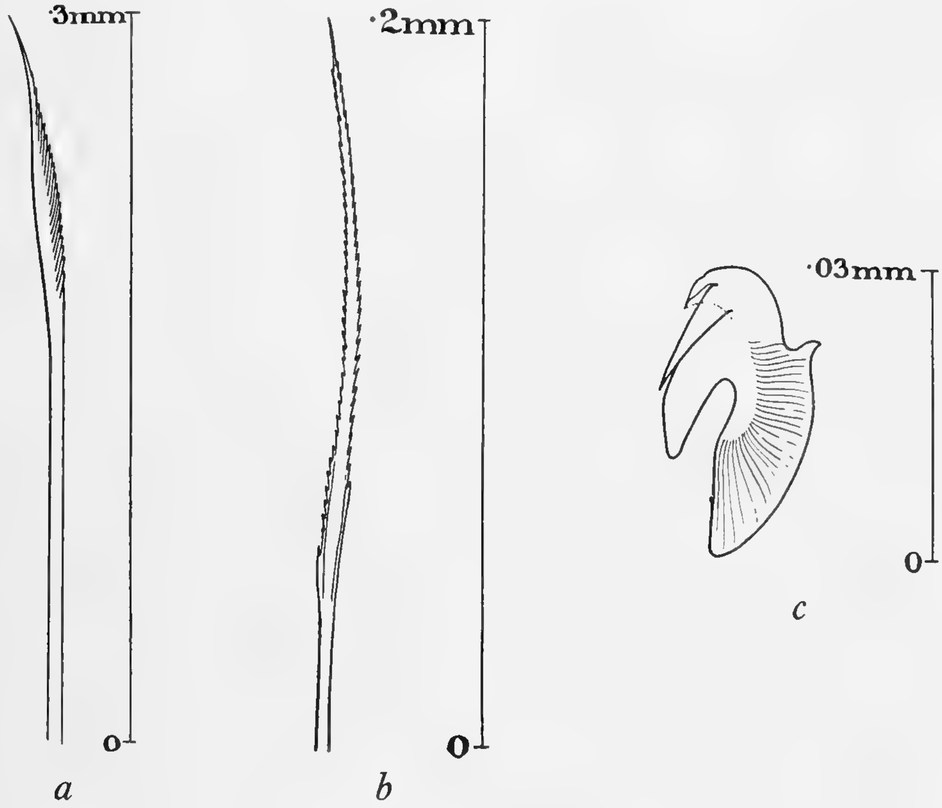


Fig. 80. *Polycirrus hamiltoni.*

a. Larger kind of dorsal bristle. *b.* Smaller kind of dorsal bristle. *c.* Hook.

Polycirrus hesslei, n.sp.

St. WS 73. 6. iii. 27. 51° 01′ 00″ S, 58° 54′ 00″ W. From 51° 02′ 00″ S, 58° 55′ 00″ W to 51° 00′ 00″ S, 58° 53′ 00″ W. 121–130 m. Gear OTC. Bottom: fine dark sand. Eight specimens.

Description. The largest specimen measures 70 mm. by 4 mm. for about 125 segments. The body is swollen and arched dorsally in the thoracic region and tapers in the abdomen. The cephalic lobe (Fig. 81, *a*) is carried forward as a large trilobed undulating membrane completely hidden by a dense tangle of long tentacles. The ventral gland shields of the 1st, 2nd and of the anterior part of the 3rd segments are fused into a large, roughly shield-shaped mass, which in some of the examples is divided by a groove corresponding in position to the anterior border of the 2nd segment. In some specimens this groove is altogether absent. There are 10 pairs of ventral gland shields, counting the reduced pairs of the 2nd and 3rd segments. These gland shields are widely

separated throughout in the mid-ventral line. There are six pairs of nephridia, extending from the 3rd to the 8th segment. As in *P. caliendrum* they decrease in size from the first to the third pairs: the remainder are of equal size and smaller than the 3rd pair.

There are several ripe females among the specimens, and these have rounded glandular orifices below the bristles in the 6th, 7th and 8th segments.

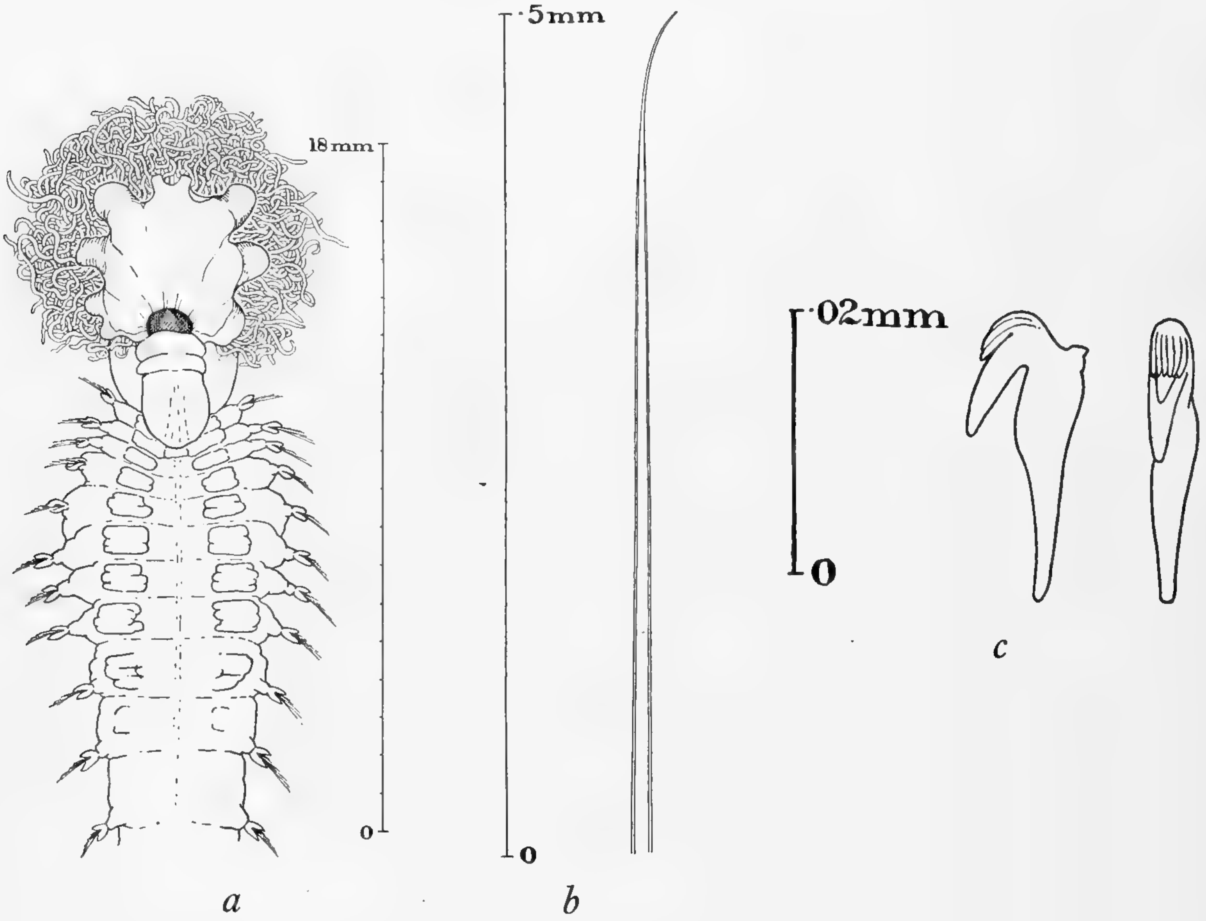


Fig. 81. *Polycirrus hesslei.*

a. Ventral view of anterior end. The tentacles have been pushed back to show the cephalic lobe. *b.* Dorsal bristle. *c.* Hooks.

The bristles begin on the 2nd segment and there are 13 notopods with cirriform processes. The uncini begin at the 14th chaetiger. The dorsal bristles (Fig. 81, *b*) are long and slender and very thinly bordered. Under a one-twelfth objective, they appear to have finely hirsute edges, which I hesitate to describe as a true denticulation. The abdominal hooks (Fig. 81, *c*) have above the main fang a single tooth surmounted by a row of about six denticles. The intestine is filled with sand.

REMARKS. This form is clearly separated from *P. kerguelensis* by the character of its dorsal bristles: it is nearer to Gravier's *P. insignis*, but differs from it in a number of

characters. Gravier's species had only 28 abdominal segments, and the bristles begin on the 4th instead of the 2nd segment. The shape of the hooks is also different.

This species belongs to the same group as *P. arenivorus* and *P. caliendrum*, but differs in having very much fewer notopods.

Genus **Lysilla**, Malmgren

Lysilla loveni, Malmgren, var. **macintoshi**, Gravier.

Hessle, 1917, p. 231.
Lysilla macintoshi, Gravier, 1907, p. 56, fig. 37.

St. 28. 16. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 45° W of Jason Light. 168 m. Gear **DC**. Bottom: mud. Five specimens.

St. 30. 16. iii. 26. West Cumberland Bay, South Georgia. 2·8 miles S 24° W of Jason Light. 251 m. Gear **DLH**. Bottom: mud and stones. Three specimens.

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 20′ 00″ S, 63° 01′ 00″ W. 160–335 m. Gear **OTL**. Bottom: mud. One specimen.

Fig. 82. *Lysilla loveni*, var. *macintoshi*. Genitonephridial orifices.

Remarks. I think Hessle is right in treating Gravier's species as a variety of the northern form. The present specimens are exceptionally large, measuring as much as 80 mm. by 5 mm. at the widest part. The northern form has not been recorded with a length greater than 60 mm. The bristles are wholly enclosed within a layer of tissue, and their ends all have the appearance of having been broken; I cannot find a trace of the characteristic spatulate enlargement at the tip. In two of the specimens, females filled with eggs, in the 4th, 5th and 6th chaetigers the place of the nephridial papillae is taken by large cordiform orifices (Fig. 82) with glandular lips. Similar orifices are mentioned by Gravier as occurring on the 3rd, 4th and 5th chaetigers in some of his examples. I regard these orifices as nephridial papillae modified for the release of the sexual products. They occur in the female only. It may have been the observation of similar orifices that led Hessle to write that contracted nephridial papillae in the northern form can assume a more or less sucker-like appearance.

Genus **Hauchiella**, Levinsen

Hauchiella tribullata (McIntosh).

Hessle, 1917, p. 233, with synonymy.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. Three specimens.

Remarks. The largest example measures 49 mm. in length without the tentacles; Hessle gives 30 mm. as the greatest recorded length. I see four pairs of nephridiopores, of which the posterior three are larger than the first pair.

Sub-family *CANEPHORINAE*, Malmgren

Genus **Terebellides**, Sars

Terebellides minutus, Hessle.

Hessle, 1917, p. 138, pl. i, fig. 16, text-fig. 29 *a–e*.

St. 30. 16. iii. 26. West Cumberland Bay, South Georgia. 2·8 miles S 24° W of Jason Light. 251 m. Gear **DLH**. Bottom: mud and stones. Six specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Eight specimens.

St. WS 62. 19. i. 27. Wilson Harbour, South Georgia. 15–45 m. Gear **BTS**. One specimen.

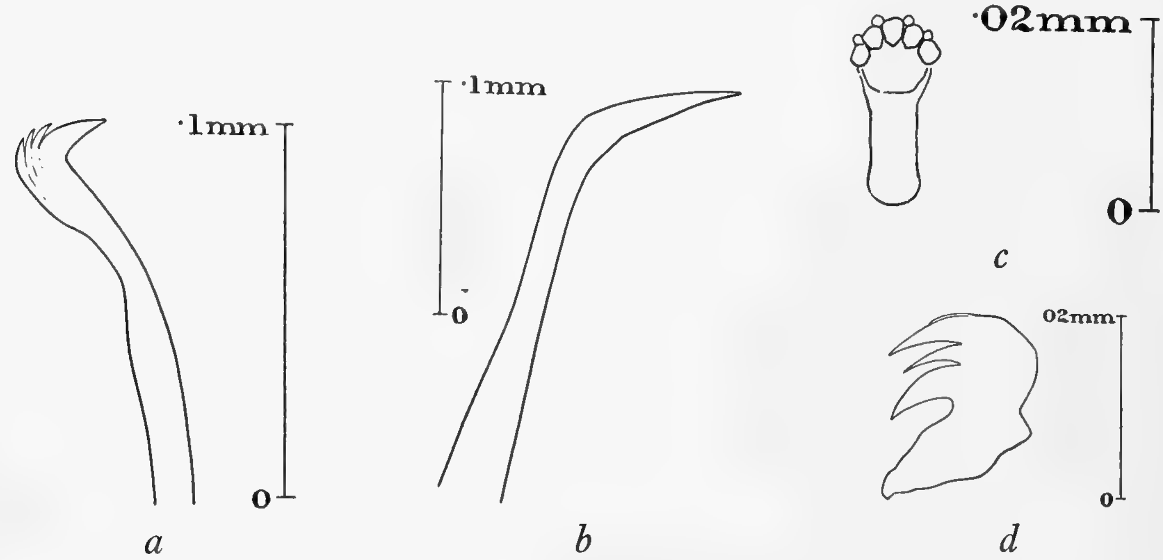


Fig. 83. *Terebellides minutus*.
a. Thoracic hook. *b*. Modified hook of 1st thoracic torus. *c*. Abdominal hook from in front. *d*. Abdominal hook in profile.

Remarks. The largest specimen measures 42 mm. in length and has 35 abdominal segments. I am inclined to think that *T. minutus*, Hessle, and *T. antarcticus*, Hessle, are the same species. Both are distinguished from *T. longicaudatus* by having the 1st notopod fully developed and by the absence of lateral flaps to the anterior segments.

Both have thoracic hooks with markedly curved necks (Fig. 83, *a*). The angle between the shaft and the terminal section of the modified hooks of the 1st neuropod (Fig. 83, *b*) varies not only from specimen to specimen but in the individual hooks of a single torus.

The general arrangement of the teeth of the abdominal hooks (Fig. 83, *c* and *d*) is the same in both species, and in this relation I may say that under an oil immersion lens the number of larger teeth in the hooks from a single abdominal pinnule appears to vary between four and six. The most usual number is five teeth.

Hessle gives the greatest recorded length for *T. minutus* as 35 mm. and that for *T. antarcticus* as 65 mm. I suggest that *T. minutus* represents a stage in the growth of *T. antarcticus*. *T. minutus* has priority.

Terebellides longicaudatus, Hessle.

Hessle, 1917, p. 139, pl. i, fig. 17, text-fig. 30 *a–c*.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Seven specimens.

St. 30. 16. iii. 26. West Cumberland Bay, South Georgia. 2·8 miles S 24° W of Jason Light. 251 m. Gear **DLH**. Bottom: mud and stones. Four specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Three specimens.

St. 182. 14. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 21′ 00″ S, 62° 58′ 00″ W. 278–500 m. Gear **N 7–T**. Bottom: mud. One specimen.

Remarks. This species is distinguished by the reduction of the 1st notopod and the great development of the side lobes of the 3rd and 4th segments. The largest specimen measures 95 mm. in length; this is 20 mm. longer than the maximum hitherto recorded. In some examples the dorsal bristles of the 1st notopod are so much reduced that they are enclosed in the tissue of the segment and only discoverable by dissection. One of the specimens from St. 30 has 19 notopods.

Family SABELLIDAE

Sub-family *SABELLINAE*

Genus **Sabella**, Linnaeus

Sabella pavonina, Savigny.

Fauvel, 1927, p. 298, fig. 102 *a–e*.

St. 91. 8. ix. 26. ·5 mile off Roman Rock, False Bay, South Africa. 35 m. Gear **NRL**. Bottom: sand. One specimen.

Remarks. After prolonged examination, I cannot separate this specimen from the European *S. pavonina*. It measures 28 mm. for the body and 9 mm. for the gills. There are only six thoracic chaetigers. There are 14 pairs of gills with three bands of dark brown pigment. The collar with its four lobes, the ventral pair being thick and fleshy, is coloured dark brown on the inside.

The sole difference that I can find between this specimen and a typical European example is that in this specimen the collar slopes more sharply backwards from the ventral to the dorsal surface, and thus leaves a greater part of the nuchal area exposed. I see no trace of fleshy pads at the base of the branchiae.

Augener records this species from Senegal.

Genus **Potamilla**, Malmgren

Potamilla antarctica (Kinberg).

Potamilla antarctica, Gravier, 1907, p. 59, text-figs. 38–43.
Potamilla antarctica (Kinberg), Benham, 1921, p. 109, with synonymy.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear **OTL**. Bottom: grey mud. Seven specimens.

St. 42. 1. iv. 26. Off mouth of Cumberland Bay, South Georgia. From 6·3 miles N 89° E of Jason Light to 4 miles N 39° E of Jason Light. 120–204 m. Gear **OTL**. Bottom: mud. Four specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Four specimens.

St. 48. 3. v. 26. 8·3 miles N 53° E of William Point Beacon, Port William, Falkland Island. 105–115 m. Gear **OTL**. Bottom: sand and shell. One specimen.

St. 55. 16. v. 26. Entrance to Port Stanley, East Falkland Island. 2 cables S 24° E of Navy Point. 10–16 m. Gear **BTS**. Three specimens.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. Sixty specimens.

St. 123. 15. xii. 26. Off mouth of Cumberland Bay, South Georgia. From 4·1 miles N 54° E of Larsen Point to 1·2 miles S 62° W of Merton Rock. 230–250 m. Gear **OTL**. Bottom: grey mud. Four specimens.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. One specimen.

St. 153. 17. i. 27. 54° 08′ 30″ S, 36° 27′ 30″ W. 106 m. Gear **DLH**. Bottom: rock. One specimen.

St. 154. 18. i. 27. Jason Harbour to Larsen Point, South Georgia. From 2·6 miles S 84° W to $5\frac{1}{2}$ cables S 26° E of Larsen Point. 60–160 m. Gear **OTL**. Bottom: mud. Five specimens.

St. 175. 2. iii. 27. Bransfield Strait, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m. Gear **DLH**. Bottom: mud, stones and gravel. Ten specimens.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH**. Bottom: stones, mud and rock. One specimen.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear **OTM**. Bottom: mud and stones. Twenty specimens.

St. WS 73. 6. iii. 27. 51° 01′ 00″ S, 58° 54′ 00″ W. From 51° 02′ 00″ S, 58° 55′ 00″ W to 51° 00′ 00″ S, 58° 53′ 00″ W. 121–130 m. Gear **OTC**. Bottom: fine dark sand. One specimen.

St. WS 79. 13. iii. 27. 51° 01′ 30″ S, 64° 59′ 30″ W. From 51° 00′ 00″ S, 65° 00′ 00″ W to 51° 03′ 00″ S, 64° 59′ 00″ W. 132–131 m. Gear **OTC**. Bottom: fine dark sand. Four specimens.

St. WS 84. 24. iii. 27. $7\frac{1}{2}$ miles S 9° W of Sea Lion Island, East Falkland Island. From 52° 33′ 00″ S, 59° 08′ 00″ W to 52° 34′ 30″ S, 59° 11′ 00″ W. 75–74 m. Gear **OTC**. Bottom: coarse sand, shell and stones. Two specimens.

St. WS 85. 25. iii. 27. 8 miles S 66° E of Lively Island, East Falkland Island. From 52° 09′ 00″ S, 58° 14′ 00″ W to 52° 08′ 00″ S, 58° 09′ 00″ W. 79 m. Gear **OTC**. Bottom: sand and shell. Three specimens.

St. WS 88. 6. iv. 27. 54° 00′ 00″ S, 64° 57′ 30″ W. From 54° 00′ 00″ S, 65° 00′ 00″ W to 54° 00′ 00″ S, 64° 55′ 00″ W. 118 m. Gear **OTC**. Bottom: sand, shell and stones. Two specimens.

St. WS 90. 7. iv. 27. 13 miles N 83° E of Cape Virgins Light, Argentine Republic. From 52° 18′ 00″ S, 68° 00′ 00″ W to 52° 19′ 30″ S, 67° 57′ 00″ W. 82–81 m. Gear **OTC**. Bottom: fine dark sand. Three specimens.

St. MS 14. 17. ii. 25. From 1·5 miles SE × S to 1·5 miles S $\frac{1}{2}$ W of Sappho Point, East Cumberland Bay, South Georgia. 190–110 m. Gear **DS**. Two specimens.

REMARKS. Almost the only character which is constant in this common and much described Antarctic species is the bristles and hooks. Benham (*loc. cit.*) gives a good account of the variation in this species, but he does not mention that the shape of the collar and especially that of the ventral lappets also shows some variation.

Genus **Bispira**, Kröyer

Bispira magalhaensis (Kinberg).

Sabella magalhaensis, Kinberg, 1857–1910, p. 72, pl. xxvii, fig. 5.
Bispira magalhaensis, Fauvel, 1916, p. 471, pl. ix, figs. 34–43.

St. 55. 16. v. 26. Entrance to Port Stanley, East Falkland Island. 2 cables S 24° E of Navy Point. 10–16 m. Gear **BTS**. Two specimens.

St. 58. 19. v. 26. Port Stanley, East Falkland Island. 1–2 m. Gear **RM**. One specimen.

REMARKS. The largest specimen from St. 58 measures 33 mm. for the body and 12 mm. for the gills. The latter have their barbules coloured brown in an irregular manner. This species is superficially very like *Potamilla antarctica*, but may be distinguished by the following characters: the collar is lower, the branchiae are spirally coiled and have their tips free from barbules, and the dorsal thoracic "scimitar" bristles are less discoidal than the spatulate bristles of *P. antarctica*.

Genus **Dasychone**, Sars

Dasychone violacea (Schmarda).

Augener, 1918, p. 580.
Non McIntosh, 1885, p. 504, pl. liii, fig. 3; pl. xxxi A, figs. 7–8; pl. xxxix A, fig. 7.
Dasychone foliosa, Ehlers, 1913, p. 572, pl. xlv, figs. 8–16.
Branchiomma violacea, Johansson, 1927, p. 164.

St. 90. 10. vii. 26. Simon's Town, False Bay, South Africa. Basin of H.M. Dockyard. 0–2 m. Gear **NH**. One specimen.

REMARKS. The body measures 12 mm. and the gills 5 mm. The body colour is pale violet and the gills a pale yellow except towards the tips, where there is a suggestion of orange. Each filament has eight eye spots and there is a band of pigment around the gill base. The collar is widely open dorsally and notched in the mid-ventral line and at the sides. The dorsal appendages (stylodes) of the branchiae are as figured by Ehlers (*loc. cit.* figs. 13 and 14).

Dasychone capensis, McIntosh, is not a synonym of this species, but is probably the same as *Dasychone cingulata*, Grube.

I heartily agree with Benham (1927, p. 137) in his refusal to follow Johansson in transferring the generic name *Branchiomma* to *Dasychone*, and in substituting *Megalomma* for *Branchiomma*.

Dasychone natalensis (Kinberg).

Branchiomma natalensis, Johansson, 1927, p. 165, with synonymy.
Dasychone violacea, McIntosh, 1885, p. 504, pl. liii, fig. 3; pl. xxxi A, figs. 7–8; pl. xxxix A, fig. 7.

Saldanha Bay Beach, South Africa, 1926. Four specimens.

REMARKS. This species, easily distinguished by the spirally twisted gill bases and the very numerous short gills with their paired foliaceous dorsal appendages is, according to Johansson, the *Sabella natalensis* of Kinberg. The largest specimen measures 82 mm. for the body and 13 mm. for the gills.

Dasychone nigromaculata (Baird).

McIntosh, 1885, p. 503, pl. liii, fig. 5; pl. xxxi A, figs. 4–6; pl. xxxix A, fig. 6.
Branchiomma nigromaculata, Johansson, 1927, p. 162, with synonymy.

St. 1. 16. xi. 25. Clarence Bay, Ascension Island. 7° 55′ 15″ S, 14° 25′ 00″ W. 16–27 m. Gear **NRM**. Bottom: coral, sand and shell. Eight specimens.

REMARKS. These are all very small specimens measuring about 7 mm. for the body and 4 mm. for the gills. I believe them to be young examples of Baird's species. The body colour is a pale green with eye spots between the rami of the feet. The barbules are splashed with brown. There are only seven gills on each side, and each gill has about five pairs of eyes and six pairs of dorsal stylodes. These are slender and filiform and of unequal size. The bristles and hooks (Fig. 84, *a*) agree with McIntosh's figures, except that the broader sort of thoracic dorsal bristle (Fig. 84, *b*) is more widely winged than as shown by McIntosh. The character of the dorsal branchial stylodes and the shape of the hook seem to be characteristic.

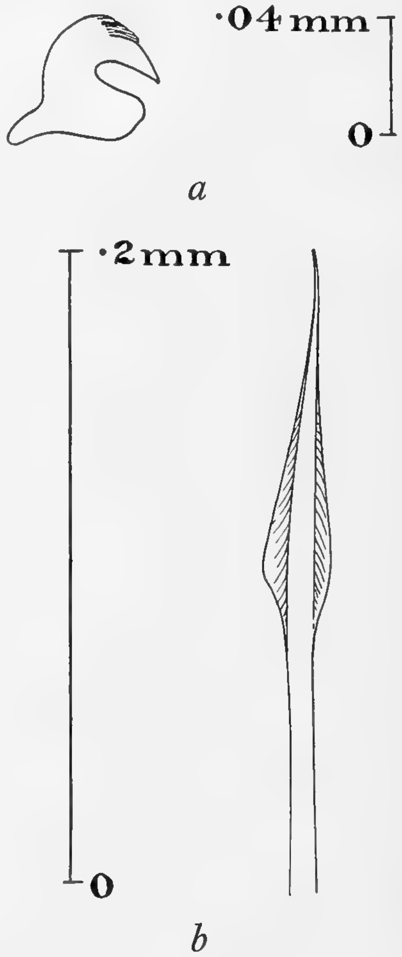


Fig. 84. *Dasychone nigromaculata*.
a. Thoracic hook. *b*. Broader thoracic bristle.

Genus **Hypsicomus**, Grube

Hypsicomus torquatus (Grube).

Augener, 1918, p. 572, text-fig. 101.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 mile to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH**. One specimen.

REMARKS. This specimen measures 12 mm. for the body and 9 mm. for the gills. Its most conspicuous character is the brown colouring of the abdominal gland shields. The present material does not permit me to add anything to Augener's full account of this species.

Genus **Euratella**, Chamberlin

Euratella puncturata (Augener).

Demonax puncturatus, Augener, 1918, p. 576, pl. vi, figs. 170–171, text-fig. 102.

St. 2. 17. xi. 25. Clarence Bay, Ascension Island, Catherine's Point and Collyer Point. Shore collection, from buoy. Five specimens.

REMARKS. Of these examples only one is complete, and this measures 7 mm. for the body and 3 mm. for the gills. There are only five thoracic chaetigers. The body is slender and flattened ventrally: there are 11 branchial filaments to each branchial lobe. These have about six bands of brown pigment. According to Augener, there are no eyes, but I am inclined to regard the paired pigment spots on the outer surface of the filaments as rudimentary eyes. There is a very distinct pigment band across the branchial lobes. Dorsally there is a pair of pigment spots at the base of the collar, and ventrally a pair below the collar lappets. There is a distinct spot in every segment between the rami of the feet.

The branchial membrane extends for about a quarter of the length of the gills; and, as Augener points out, the rachis of the filaments is thickened in places on its outer surface, suggesting rudimentary dorsal stylodes.

There is a pair of palps equal in length to the branchial membrane. The collar is widely open dorsally, slightly notched at the sides and forms two triangular lappets ventrally. The faecal groove is very indistinct. The bristles and hooks correspond so closely to Augener's description and figures that there is nothing I can add.

Augener attributed this species "mit einiger Reserve" to *Demonax*, Kinberg. On the other hand, Johansson, who has examined Kinberg's Sabellid types, claims that *Demonax* has pickaxe chaetae in the ventral tori of the thorax. It therefore cannot belong to *Demonax*.

With its bristles of two kinds, neither kind spatulate, both in thorax and abdomen, and its avicular hooks unaccompanied by pickaxe chaetae in the thorax, it seems to be generically allied to *Laonome salmacidis*, Claparède (v. Fauvel, 1927, p. 323, fig. 112 *s–x*), which is the type species of Chamberlin's *Euratella*.

In the type species, however, the abdominal capillary bristles differ from those of the present species and are said to occur in the terminal segments only.

Sub-family *FABRICIINAE*

Genus **Euchone**, Malmgren

Euchone pallida, Ehlers.

Ehlers, 1908, p. 159, pl. xxi, figs. 10–15; pl. xxii, figs. 1–4.
Benham, 1927, p. 139, pl. iv, figs. 126–130.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. From 8 cables S 81° W of Merton Rock to 1·3 miles N 7° E of Macmahon Rock. 179–235 m. Gear OTL. Bottom: grey mud. Three specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. Fifty specimens.

St. 123. 15. xii. 26. Off mouth of Cumberland Bay, South Georgia. From 4·1 miles N 54° E of Larsen Point to 1·2 miles S 62° W of Merton Rock. 230–250 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 167. 20. ii. 27. Off Signy Island, South Orkneys. 60° 50′ 30″ S, 46° 15′ 00″ W. 244–344 m. Gear **N 4–T**. Bottom: green mud. One specimen.

St. 172. 26. ii. 27. Off Deception Island, South Shetlands. 62° 59′ 00″ S, 60° 28′ 00″ W. 525 m. Gear **DLH**. Bottom: rock. One specimen.

St. 195. 30. iii. 27. Admiralty Bay, King George Island, South Shetlands. 62° 07′ 00″ S, 58° 28′ 30″ W. 391 m. Gear **OTM**. Bottom: mud and stones. One specimen.

St. MS 68. 2. iii. 26. East Cumberland Bay, South Georgia. 1·7 miles S ½ E to 8½ cables SE × E of Sappho Point. 220–247 m. Gear **NRL**. Two specimens.

REMARKS. The largest specimen is that from St. 167 and it measures 63 mm. for the body; the gills are damaged, so that an exact measurement is impracticable, but they appear to have measured about 15 mm. This specimen has 32 abdominal chaetigers, as had Ehlers' original example. The specimen from St. 172 has 26 abdominal chaetigers as had Benham's examples: it measures 20 mm. for the body and about 10 mm. for the gills. On the other hand, the numerous specimens from St. 45 have an average measurement of 25 mm. for the body and 15 mm. for the gills, with only 22 abdominal chaetigers.

The collar is extremely delicate and is apt to present a rather different appearance in different specimens from the same locality. The mid-ventral cleft extends, as Benham says, to the anterior border of the 1st ventral gland shield. Dorsally, the appearance of the collar depends upon the degree of development of the two parallel glandular areas which Benham calls the nuchal gland. In some specimens this gland is not visible. The inner dorsal edges of the collar are fused in their lower part with two lamellae, which are at their ventral edges continuous with the pair of fleshy pads at the base of the branchial lobes. When the nuchal gland is developed, these lamellae are themselves thickened and glandular, and appear as anterior continuations of the nuchal gland. I can confirm Benham's account of the intrabranchial naked filaments, which are, as Fauvel has shown, greatly elongated barbules. The caudal membranes vary greatly in depth and in the extent to which they curve over towards the mid-line.

All the tubes are of the yellow horny kind as described by Benham, except two from St. MS 68, which have mud walls as described by Ehlers. This is puzzling, but on scraping away the mud, a horny substructure, which appears similar to the ordinary horny tubes, is revealed.

I do not believe that more than one species of *Euchone* is represented by these specimens.

Genus **Jasmineira**, Langerhans

Jasmineira scotti, Benham.

Benham, 1927, p. 131, pl. iii, figs. 100–107.
? *Jasmineira caeca*, Ehlers, 1913, p. 579.

St. WS 33. 21. xii. 26. 54° 59′ 00″ S, 35° 24′ 00″ W. 130 m. Gear N 100 H. Bottom: grey mud and stones. One specimen.

REMARKS. One specimen in poor condition and its tube. The specimen measures 9 mm. for the body and 4 mm. for the gills. There are eight thoracic and fifteen abdominal chaetigers. There are no colour markings. The condition is such that the example can only be doubtfully attributed to a species. There appears to be a membrane extending for about a third the length of the gills: the head region and collar are too much damaged for description. Dorsally there are two large prominent glandular pads, running from the 3rd chaetiger to the base of the head region. I take this to be a nuchal gland, and the dorsal lappets of the collar appear to be fused with it. The thoracic bristles consist of winged (Fig. 85, *a*) and spatulate bristles, and the thoracic hooks (Fig. 85, *b*) have very long downwardly directed manubria and crests of four to five rows of denticles; the abdominal bristles are slender and capillary without borders; the abdominal hooks (Fig. 85, *c*) are avicular with crests of eight rows of teeth.

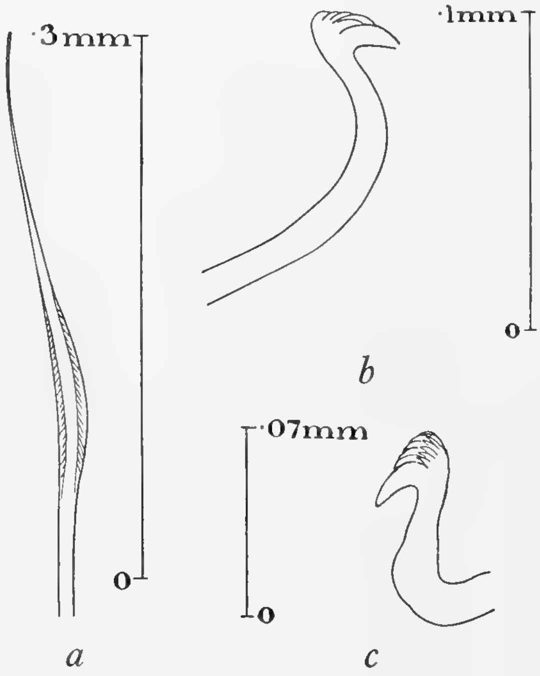


Fig. 85. *Jasmineira scotti.*

a. Winged thoracic bristle. *b*. Thoracic hook. *c*. Abdominal hook.

The chaetae of this specimen agree with Benham's description and figures closely except in one particular: in this specimen, the end of the manubrium of the abdominal hooks turns back sharply at right angles to the rest of the shaft and is not gently curved backwards as it is in Benham's fig. 106.

Ehlers' *J. caeca* from Kerguelen is briefly described without figures, but is probably synonymous with Benham's species. As already said, I can only doubtfully assign the present specimen to a species. The tubes are incrusted with sand grains and small black stones.

Family SERPULIDAE

Sub-family *SERPULINAE*

Genus **Serpula**, Linnaeus

Serpula vermicularis, Linnaeus.

Fauvel, 1927, p. 351, fig. 120 *a–q*.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 3·3 miles S 44° E of Jason Light. 110 m. Gear **DL**. Bottom: mud and rock. Forty specimens.

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m. Gear **OTL**. Bottom: grey mud. One specimen.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. From 54° 02′ S, 36° 38′ W to 54° 11′ 30″ S, 36° 29′ W. 122–136 m. Gear **OTL**. Bottom: green mud and stones. One specimen. Gear **N 4–T**. Three specimens.

St. 146. 8. i. 27. 53° 48′ 00″ S, 35° 37′ 30″ W. 728 m. Gear **DLH**. Bottom: rock. Three specimens.

St. 160. 7. ii. 27. Near Shag Rocks. 53° 43′ 40″ S, 40° 57′ 00″ W. 177 m. Gear **DLH**. Bottom: grey mud, stones and rock. Ten specimens.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 93–126 m. Gear **DLH**. Bottom: stones, mud and rock. Two specimens.

St. WS 27. 19. xii. 26. 53° 55′ 00″ S, 38° 01′ 00″ W. 107 m. Gear **N 100 H**. Bottom: gravel. Thirty specimens.

St. WS 77. 12. iii. 27. 51° 01′ 00″ S, 66° 31′ 30″ W. From 51° 00′ 00″ S, 66° 30′ 00″ W to 51° 02′ 00″ S, 66° 33′ 00″ W. 110–113 m. Gear **OTC**. Bottom: coarse dark sand. Six specimens.

St. WS 79. 13. iii. 27. 51° 01′ 30″ S, 64° 59′ 30″ W. From 51° 00′ 00″ S, 65° 00′ 00″ W to 51° 03′ 00″ S, 64° 59′ 00″ W. 132–131 m. Gear **OTC**. Bottom: fine dark sand. Four specimens.

St. WS 92. 8. iv. 27. 51° 58′ 30″ S, 65° 01′ 00″ W. From 52° 00′ 00″ S, 65° 00′ 00″ W to 51° 57′ 00″ S, 65° 02′ 00″ W. 145–143 m. Gear **OTC**. Bottom: fine dark sand and stones. Vermidom with tubes of *Idanthyrsus armatus*.

St. MS 71. 9. iii. 26. East Cumberland Bay, South Georgia. $9\frac{1}{4}$ cables E × S to 1·2 miles E × S of Sappho Point. 110–60 m. Gear **BTS**. Ten specimens.

Serpula loveni (Kinberg).

Zopyrus loveni, Kinberg, 1857–1910, p. 71, pl. xxvii, fig. 5.

St. WS 128. 10. vi. 27. West side of Gough Island, inshore. 40° 19′ 00″ S, 10° 04′ 00″ W. 120–90 m. Gear **DLH**. Six specimens and numerous tubes.

Description. The average length is 15 mm. There are no colour markings. There are seven thoracic chaetigers. The two branchial lobes have each 14 filaments: these filaments have naked filiform tips. Of these examples four have oval bilaterally symmetrical opercula (Fig. 86, *a* and *b*) and the remaining two radially symmetrical round opercula (Fig. 86, *c*). The peduncle shows a marked constriction below the operculum, which is inserted more or less centrally on its stalk. The number of rays or teeth on the operculum varies between 12 and 24. They are large and well separated by radial

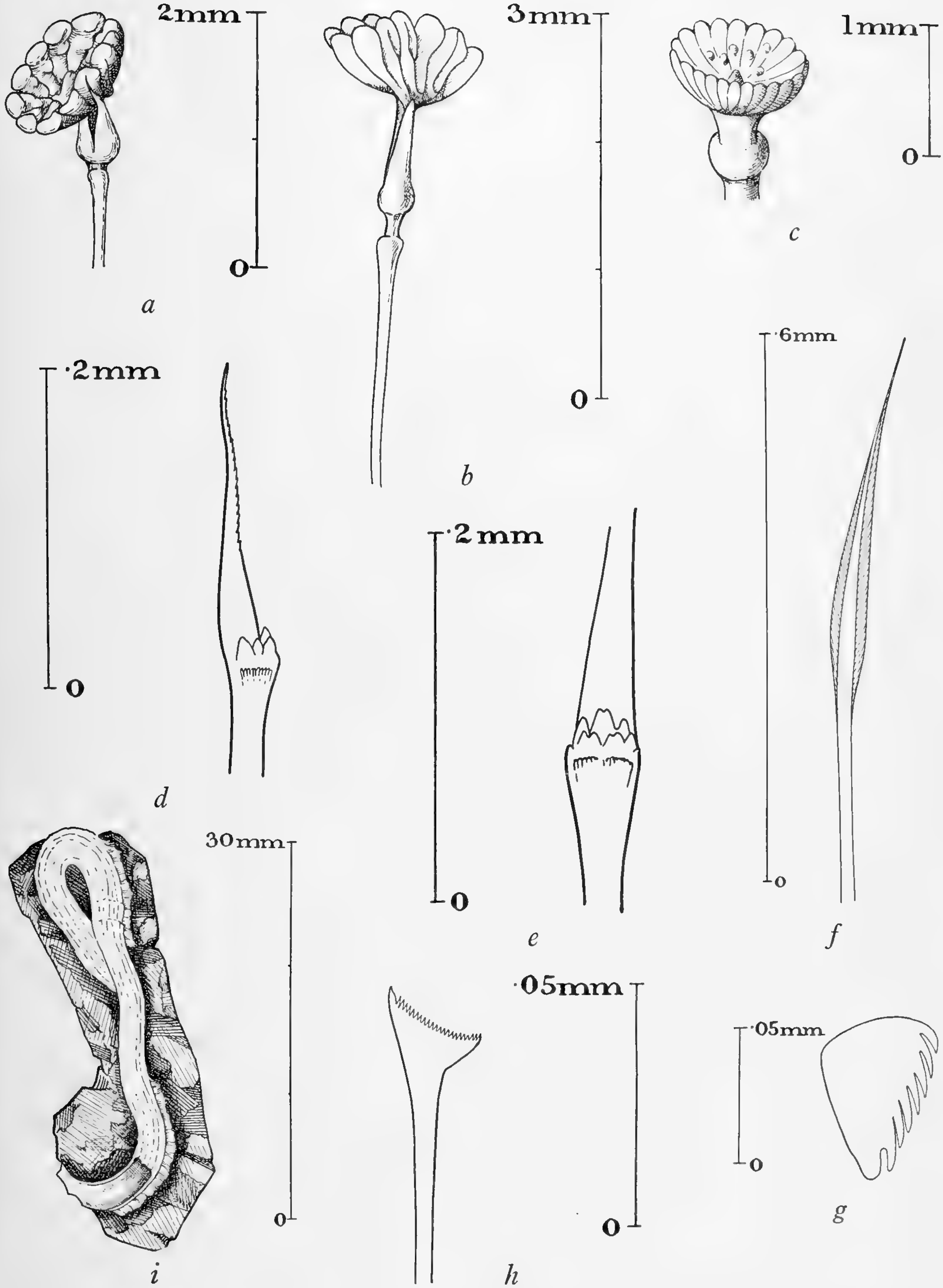


Fig. 86. *Serpula loveni.*

a. Operculum. *b.* Operculum. *c.* Operculum. *d.* Collar bristle. *e.* Collar bristle. *f.* Dorsal thoracic bristle. *g.* Thoracic hook. *h.* Abdominal bristle. *i.* Tube.

furrows. Each ray has on its inside a more or less pronounced eminence, but there are no spines like those in *Hydroides*. There is a club-shaped pseudo-operculum on the opposite branchial lobe to the operculum.

The collar is trilobed with a large folded ventral lobe and two lateral lobes which are fused with the thoracic membrane. The latter is rather macerated, but as far as can be seen, it forms a triangular lappet on the ventral surface behind the thorax.

The collar bristles consist of capillary bristles with delicately denticulated borders and "bayonet" bristles (Fig. 86, *d* and *e*). The teeth at the base of the blade in these are much worn and vary much in appearance according to the angle at which they are seen. Looked at directly from above, there are at the top of the boss three teeth in a line, a large tooth and a smaller tooth on each side: the large tooth begins a little below the other two and is set further away from the shaft. Near the base of the large tooth and forming the second row are two double teeth on each side of the chaetal shaft. Below these again is a row of small denticles.

The remaining dorsal thoracic bristles are bordered capillaries (Fig. 86, *f*). The thoracic hooks (Fig. 86, *g*) are provided with six to seven teeth.

In the abdomen, in addition to the dorsal hooks, there are ventral bristles (Fig. 86, *h*) shaped like compressed cups with denticulated edges. One lateral tooth is more developed than the rest. In the posterior abdominal segments there are long capillary chaetae. The tubes (Fig. 86, *i*) are all fragmentary. They are sinuous, with several low and ill-defined longitudinal ridges, and without distinct peristomes: at their base they coil round in a loose loop-shaped spiral: they are tinged with red.

REMARKS. Kinberg's description and figures of *Zopyrus loveni* are insufficient for its certain recognition. As far as they go, they seem to agree with the present specimens. The present species is very close to *S. lo-biancoi*, Rioja, which differs, however, in a number of details. In *S. lo-biancoi* the operculum is eccentrically inserted on its stalk and does not show the same range of variation as does that of this species. Moreover, the arrangement of the denticles on the spur of the collar bristles and the number of teeth in the thoracic hooks are different.

Genus **Hydroides**, Gunner

Hydroides norvegica (Gunner).

Fauvel, 1927, p. 356, fig. 122 *i–o*.
McIntosh, 1924, p. 50.

St. 91. 8. ix. 26. ·5 mile off Roman Rock, False Bay, South Africa. 35 m. Gear **NRL**. Bottom: sand. One specimen.

REMARKS. McIntosh has recorded this species from the Cape. The present specimen is a typical *norvegica*, except that there are only 10 chitinous rays on the operculum: the northern forms usually have a larger number. The rays have two teeth on each side and are strongly hooked.

Genus Vermiliopsis, Saint-Joseph

Vermiliopsis notialis, n.sp.

St. 148. 9. i. 27. Off Cape Saunders, South Georgia. From 54° 03′ S, 36° 39′ W to 54° 05′ S, 36° 36′ 30″ W. 132–148 m. Gear OTL. Bottom: grey mud and stones. Two specimens.

Description. Along and across a Cidarid spine is a number of small Serpulid tubes, in contact all their length with the substratum. They have large peristomes and three parallel toothed crests, recalling those of the Mediterranean *V. multicristata*. Unfortunately I was unable to extract a worm from them in any but a very poor condition. The measurements are about 10 mm. by ·5 mm. Owing to the bad condition I cannot with certainty discover the number of thoracic chaetigers. There are probably seven, the usual number for the genus. I am also unable to give an account of the collar and thoracic membrane. A thoracic membrane is at any rate present. Each branchial lobe (Fig. 87, *a*) has six rather short filaments, which are adherent and have the barbules continued to the tip (Fig. 87, *b*). The opercular peduncle has neither barbules nor wings. The operculum itself (Fig. 87, *c* and *d*) is a vesicular body, surmounted by a long cone ending in one example in a cup-like disk. The cone is covered with long chitinous spines except for a triangular area running up its outer face.

The 1st chaetiger has limbate bristles (Fig. 87, *e*) and fine capillary bristles (Fig. 87, *f*) with a denticulated edge. The remaining thoracic notopodia have similar bristles, and from the 3rd chaetiger backwards a number of *Apomatus* bristles (Fig. 87, *g*) in addition. The thoracic hooks (Fig. 87, *h*) have 10 to 12 teeth of which the basal is far the most prominent: this tooth is not excavated. The abdominal hooks are similar in form, but smaller. The ventral abdominal bristles (Fig. 87, *i*) are geniculate, and in the posterior abdominal segments there are a number of simple capillary bristles (Fig. 87, *k*). I figure a portion of a tube (Fig. 87, *l*).

Remarks. The description of this species must remain incomplete until the acquisition of more and better material. The operculum with its chitinous spines seems to be characteristic. In fact, under the present system of using rather wide variations in the operculum as generic differentials, it might justify the establishment of a new genus. On the other hand, in all characters except the operculum, the species agrees with *Vermiliopsis*; and the reduplication of Serpulid genera based on differences in the operculum alone is to be deprecated.

Vermiliopsis glandigerus, Gravier.

Gravier, 1908, p. 121, pl. viii, figs. 290–291, text-figs. 476–481.
Augener, 1918, p. 602.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear DLH. Four specimens.

Remarks. I believe these examples to be conspecific with the specimens from Annobon attributed to Gravier's species by Augener. The operculum (Fig. 88, *a*) is,

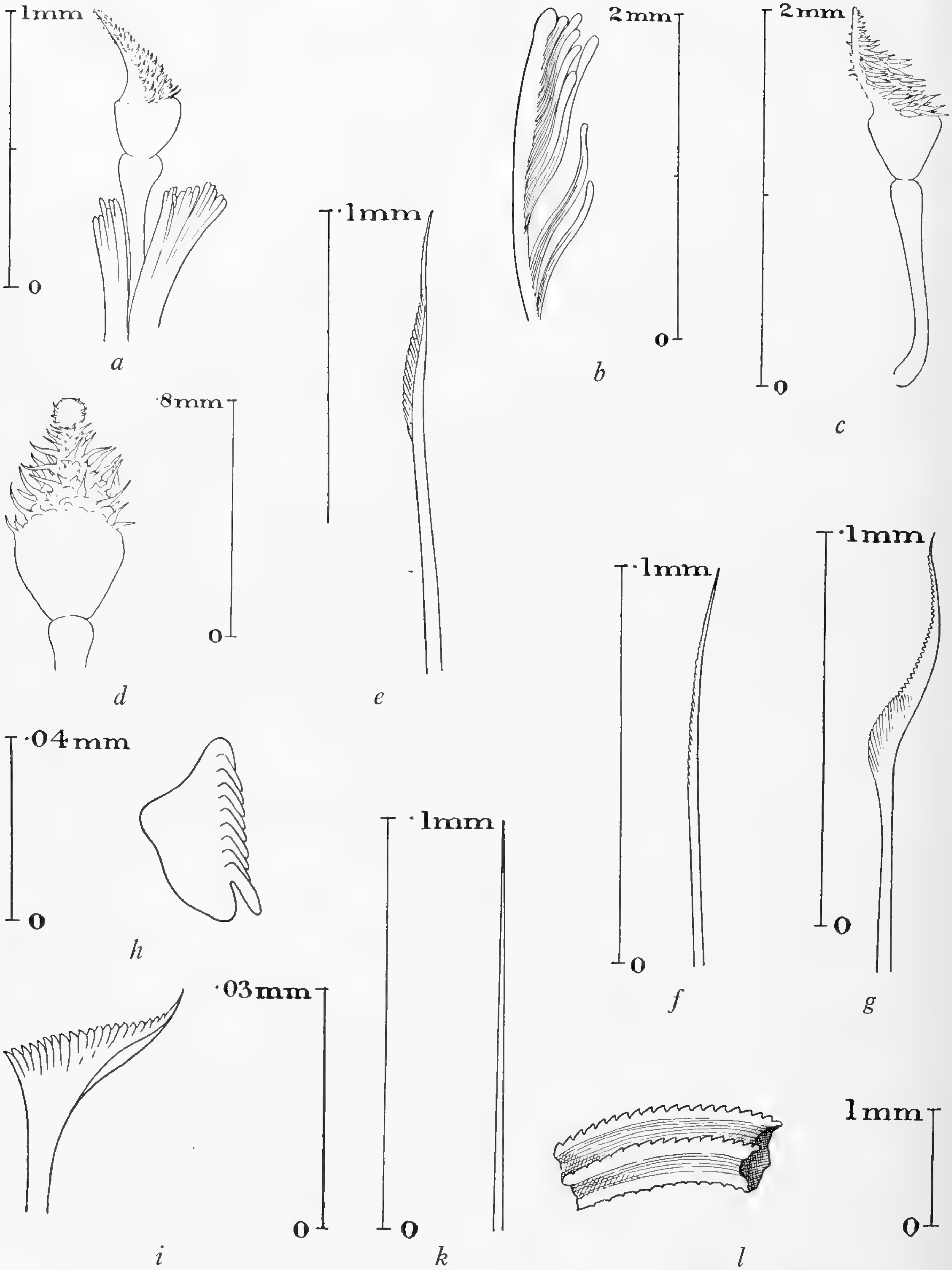


Fig. 87. *Vermiliopsis notialis.*

a. Operculum and gills. *b.* Gill filament. *c.* Operculum. *d.* Operculum. *e.* Bordered bristle. *f.* Capillary bristle. *g.* "Apomatus" bristle. *h.* Thoracic hook. *i.* Geniculate abdominal bristle. *k.* Abdominal capillary bristle. *l.* Portion of a tube.

however, very variable in form, and only one specimen shows the three rings described by Gravier. In two examples the operculum is more like that of *V. infundibulum* than that of *V. glandigerus*. In fact, in the light of the great variability of the operculum, the two species are very hard to separate. The largest specimen measures 30 mm. by 3 mm. across the thorax. The thoracic membrane is fused with the thorax only as far

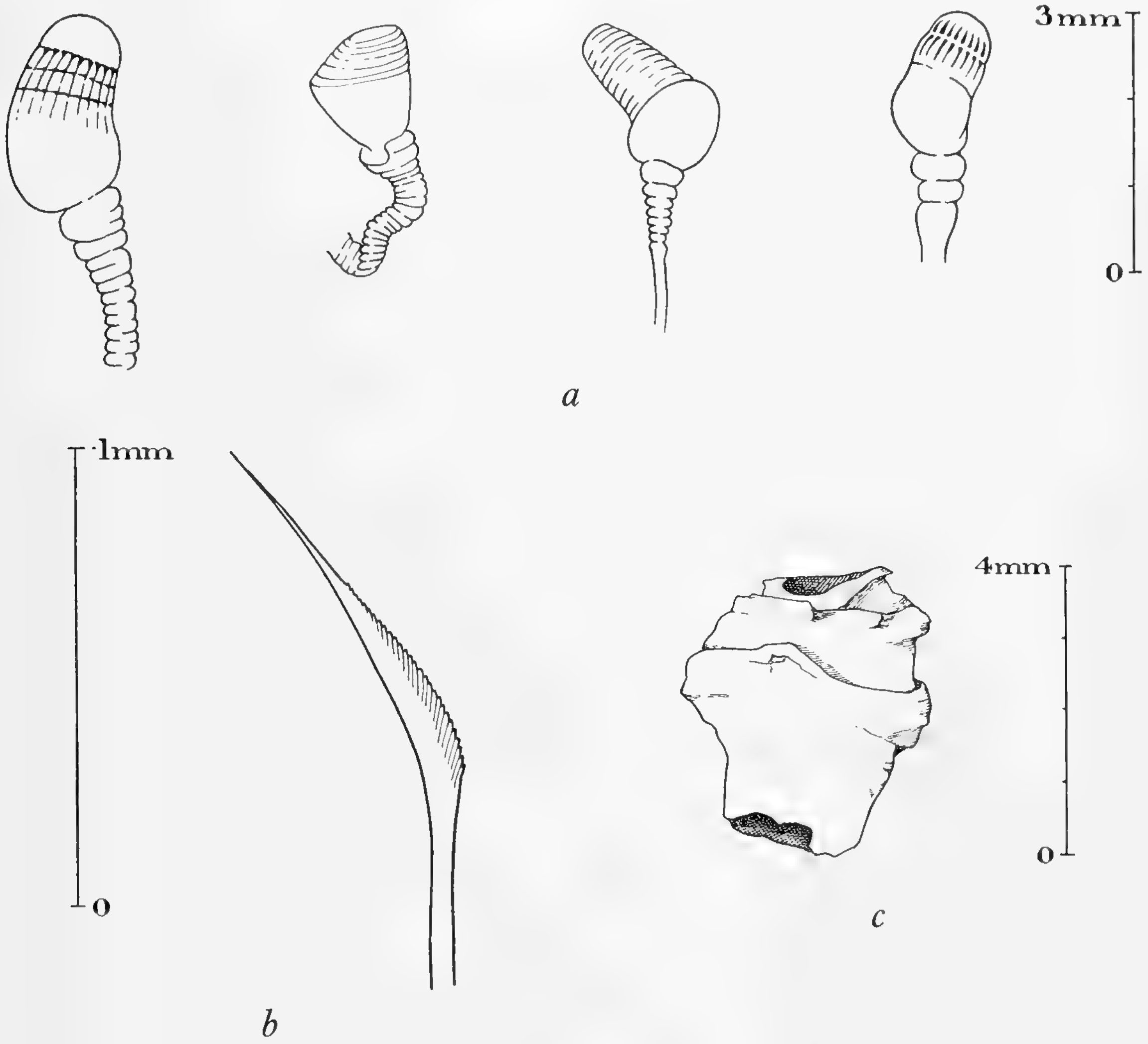


Fig. 88. *Vermiliopsis glandigerus*.

a. Opercula. *b*. Abdominal bristle. *c*. Portion of a tube.

as the 5th chaetiger. The abdominal bristles (Fig. 88, *b*) are closer to that figured by Gravier (text-fig. 481) than to that figured by Fauvel (1927, p. 364, fig. 124*f*) for *V. infundibulum*. I have only a fragment of a tube (Fig. 88, *c*), and this shows successive funnel-like ridges formed by the growth of successive peristomes. I have figured a number of opercula to show the variation.

I think it probable that *V. glandigerus*, Gravier, *V. acanthophora*, Augener, and *V. langerhansi*, Fauvel, will all prove to be simple varieties of *V. infundibulum*.

Vermiliopsis richardi, Fauvel, var. **fauveli,** var. nov.

Vermiliopsis richardi, Fauvel, 1927, p. 366, fig. 126 *a–m*.

St. 283. 14. viii. 27. Off Annobon, Gulf of Guinea. ·75 to 1 mile N 12° E of Pyramid Rock, Annobon. 18–30 m. Gear **DLH.** Three specimens.

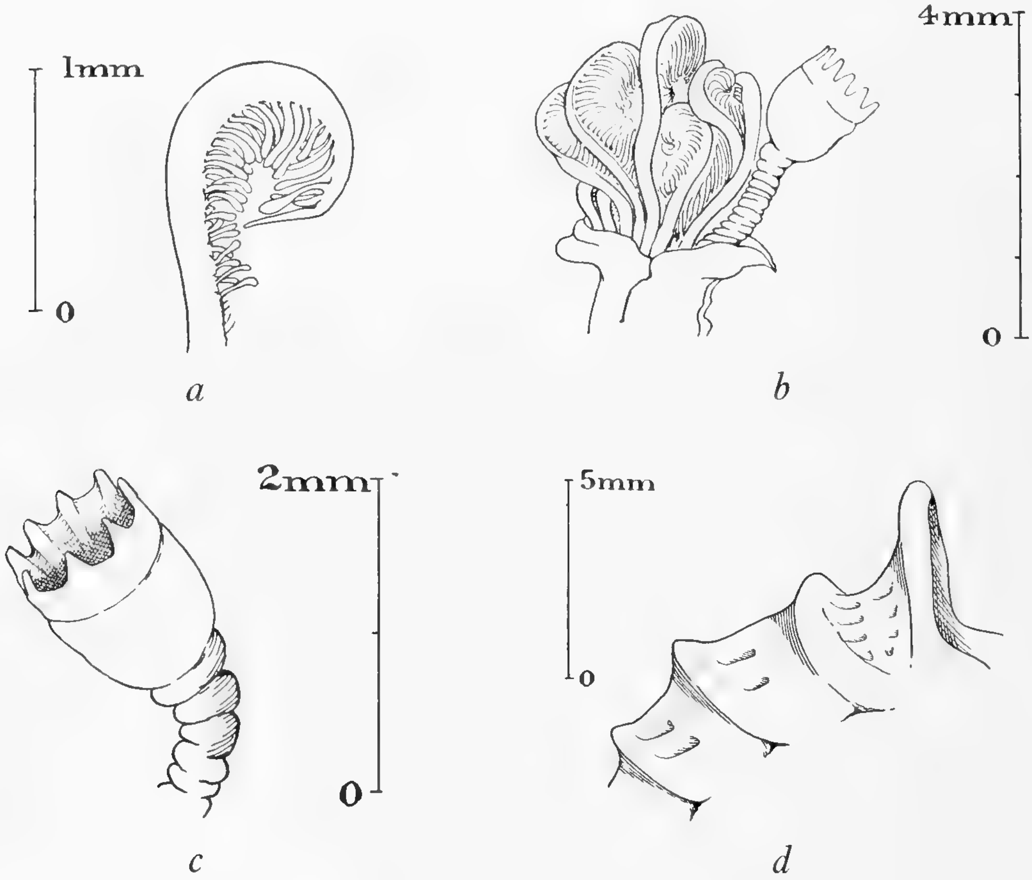


Fig. 89. *Vermiliopsis richardi*, var. *fauveli*.

a. Gill filament. *b*. Anterior end seen from the side. *c*. Operculum. *d*. Tube.

Description. The average measurement is about 15 mm. in length. These specimens correspond in detail with Fauvel's account of his species, except in the following particulars. The extremity of the branchial filaments (Fig. 89, *a*) is not spatulate but filiform, and I can see no eyes on their dorsal surfaces. Moreover, the hooks begin at the 2nd and not the 3rd thoracic chaetiger. Otherwise, in the absence of a branchial membrane, in the presence of a spiral base to the filaments, in the shape of the collar, in the structure of the operculum (Fig. 89, *b* and *c*) and in the character of the bristles, these specimens agree with Fauvel's account. Moreover, the tube (Fig. 89, *d*), with its very wide peristomes and its longitudinal ridges, seems to be similar to that described by Fauvel.

Sub-family *FILOGRANINAE*

Genus Salmacina, Claparède

Salmacina dysteri (Huxley), var. **falklandica**, var. nov.

Salmacina dysteri (Huxley), Fauvel, 1927, p. 377, fig. 129 *c–k*.

St. WS 85. 25. iii. 27. 8 miles S 66° E of Lively Island, East Falkland Island. From 52° 09′ 00″ S, 58° 14′ 00″ W to 52° 08′ 00″ S, 58° 09′ 00″ W. 79 m. Gear OTC. Bottom: sand and shell. Numerous specimens.

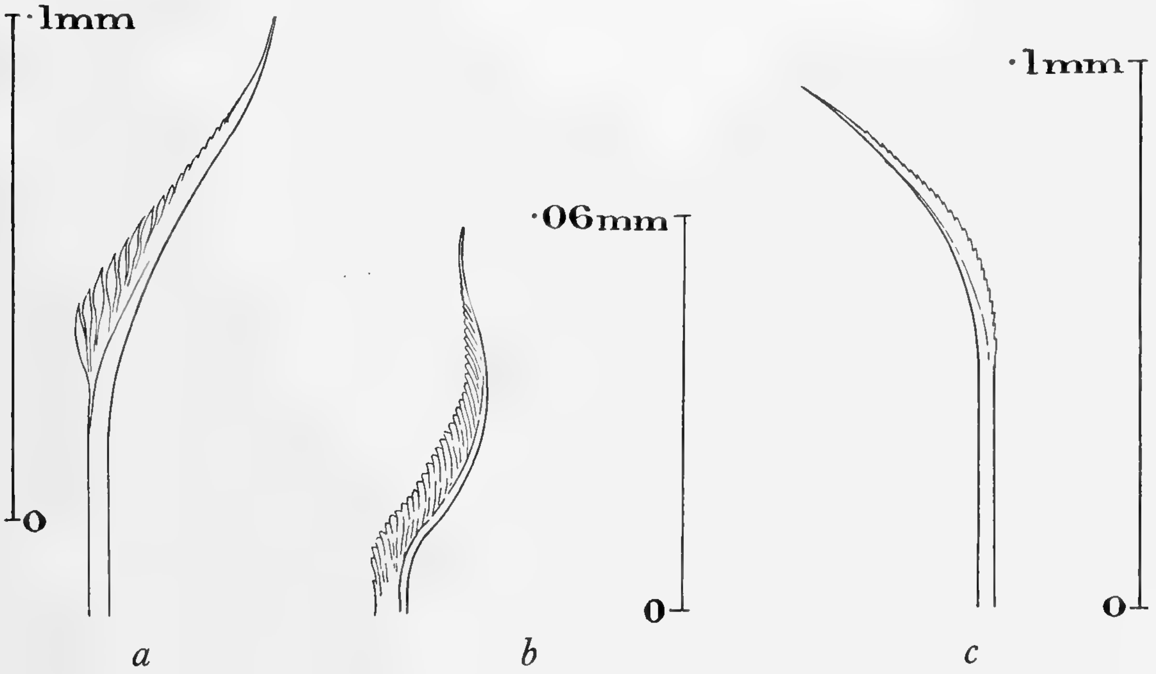


Fig. 90. *Salmacina dysteri*, var. *falklandica*.
a. Collar bristle. *b*. Thoracic sickle bristle. *c*. Abdominal bristle.

Description. A number of delicate, smooth, white tubes, more or less straight and lying flat on several fragments of a calcareous Polyzoan. The contained worms agree with the common *S. dysteri* except in the collar bristles (Fig. 90, *a*), which do not show the typical gap or notch above the toothed spur. In these specimens the teeth are continued without interruption up the blade. Furthermore, the thoracic "sickle" bristles (Fig. 90, *b*) appear to be denticulated, the serrations being real and not due merely to the folding of the concave edge of the blade. There are seven thoracic chaetigers and each branchial lobe has four filaments. The abdominal bristles (Fig. 90, *c*) are geniculate and denticulated.

The bristles of this form differ sufficiently from those of the typical *S. dysteri* to justify the creation of a new variety. They show affinities with the bristles of the Spirorbids.

As far as I know, *S. dysteri* has not been recorded further south than Gough Island.

Sub-family *SPIRORBINAE*

Genus **Spirorbis**, Daudin

Spirorbis, sp. divers.

Remarks. There are in this collection about half a dozen bottles containing examples of *Spirorbis* from various localities. I feel that I am unable to report upon these without undertaking a revision of the whole sub-family, a task which at the moment I cannot attempt.

Fig. 91. *Helicosiphon biscoeensis*. Tube.

I should like, however, to point out here that the tube (Fig. 91) of *Helicosiphon biscoeensis*, Gravier (1907, p. 63, Pl. v, figs. 49–52), is not, as Gravier supposed, free. It is attached at its narrow base to the substratum, makes two or three sinistral spiral coils and then turning upwards is solute for the rest of its length. The lower portion of the solute part of the tube is strongly fluted, but this fluting disappears apically.

My examples of Gravier's species are from St. 175, Bransfield Strait, South Shetlands, 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m.

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IN GREAT BRITAIN
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DISCOVERY REPORTS

Vol. II, pp. 223–260, plate 1, text-figs. 1–12

Issued by the Discovery Committee, Colonial Office, London
on behalf of the Government of the Dependencies of the Falkland Islands

THORACIC CIRRIPEDES COLLECTED IN 1925–1927

by

C. A. Nilsson-Cantell, Sweden

CAMBRIDGE
AT THE UNIVERSITY PRESS
1930

Price four shillings net

Cambridge University Press
Fetter Lane, London

New York
Bombay, Calcutta, Madras
Toronto
Macmillan

Tokyo
Maruzen Company, Ltd

[*Discovery Reports*. *Vol. II*, *pp*. 223–260, *Plate I*, *text-figs*. 1–12, *October*, 1930.]

THORACIC CIRRIPEDES COLLECTED IN 1925-1927

By

C. A. NILSSON-CANTELL, SWEDEN

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THORACIC CIRRIPEDES COLLECTED IN 1925-1927

By C. A. Nilsson-Cantell, Sweden

(Plate I, text-figs. 1–12)

INTRODUCTION

THIS collection of Cirripedes was brought home by the R.R.S. 'Discovery', the R.R.S. 'William Scoresby', and the staff of the Marine Biological Station at South Georgia, during the years 1925–7. For the opportunity to study this collection I have to express my best thanks to the chief of the expedition, Dr Stanley Kemp. I wish also to thank Mr N. A. Mackintosh and Mr D. D. John, London, for assistance with the localities and the printing, and Dr W. T. Calman, London, Prof. Dr A. Schellenberg, Berlin, and Dr N. Odhner, Stockholm, for giving me the opportunity to compare material in the collections under their charge. I also wish to express my best thanks to Mr T. Withers, London, for his kind assistance in correcting the English translation.

Stations made by the 'Discovery' are entered first in the lists of localities under the species headings and have no letters prefixed to the numbers. Those of the 'William Scoresby' follow and are distinguished as WS 73, etc. Where the material was collected from whales, the sex and length of the whale, and the serial number (No. 46, No. 968, etc.) assigned to it by the Discovery observers, are given. A number of the specimens were taken from whales for which such data are not available.

The following symbols are used for nets, apparatus, etc., in accordance with *Discovery Reports*, 1, *Station List*:

BTS	Small beam trawl. Beam 8 ft. in length (2·45 m.): mesh at cod-end ½ in. (12·5 mm.). All measurements are taken from knot to knot along one side of the mesh, not diagonally with the mesh stretched.
DC	Conical dredge. Mouth 16 in. in diameter (40·5 cm.), with canvas bag.
DL	Large dredge. Light pattern, 4 ft. in length (1·2 m.).
DLH	Large dredge. Heavy pattern, 4 ft. in length (1·2 m.).
LH	Hand lines.
N 4–T, N 7–T	Nets with mesh of 4 mm. or 7 mm. (0·16 or 0·28 in.) attached to back of trawl.
N 100 H	1 m. tow-net. Mouth circular, 1 m. in diameter (3·3 ft.): mesh graded, at cod-end 16 to the linear inch. Horizontal.
NH	Hand net.
NRL	Large rectangular net. Frame 8 ft. long and 2¼ ft. wide (2·45 m. × 0·7 m.) with bag of ½ in. mesh (12·5 mm.).
OTC	Commercial otter trawl. Head rope 80 ft. (24·5 m.): mesh at cod-end 1½ in. (3·8 cm.).
OTL	Large otter trawl. Head rope 40 ft. (12·2 m.): mesh at cod-end 1¼ in. (3·2 cm.).
RM	Mussel rake.

The abbreviations used in denoting the nature of the bottom are:

c. coarse.	gn. green.	s. sand.
d. dark.	m. mud.	sh. shells.
f. fine.	r. rock.	st. stones.
g. gravel.		

"When no addition is made to the figures in the depth column, it is always to be understood that the tow-net or young-fish trawl was closed before hauling; but when such an expression as (–0) or (–50) follows the figure for depth, it is implied that the net, though fishing for the time indicated at the major depth, was hauled open to the surface or to a higher level." (Cited from *Discovery Reports*, I, p. 5.)

The depths of the water at the beginning and at the end of trawling stations are shown, as, *e.g.* St. 48, 105–115 m.

GENERAL

The Discovery collection of thoracic Cirripedes contains fifty-five different finds, most of them from the Southern Ocean, grouped round the Falkland Islands, Cape Horn, the South Shetlands, Palmer Archipelago, Elephant and Clarence Islands, South Georgia, Tristan da Cunha, and the south and west coast of Africa. The most southerly locality is 64° 58′ S, 65° 35′ W (St. 190), the most northerly 14° 45′ N, 18° 34′ W, the most westerly St Martin's Cove, Hermite Island, Cape Horn (St. 222), and the most easterly Durban on the east coast of South Africa—the only find from the Indian Ocean.

The number of species is shown in the following table:

Genus	Total number of species	New species
Scalpellum	6	3
Lepas	2	—
Conchoderma	2	—
Hexelasma	1	—
Balanus	2	—
Elminius	1	—
Coronula	2	—
Xenobalanus	1	—
Total number	17	3

This table shows that the collection is not very rich in species; but of some common species, such as *Conchoderma auritum*, *Coronula diadema* and *C. reginae*, many specimens were taken from different stations. Eight genera are represented. Most species (six) belong to *Scalpellum*, of which genus many species have already been described, although some are uncertain. Those in the present collection all seem to be well defined, and three new species are here described.

The species of *Scalpellum* were collected in the so-called Southern Ocean and the southern part of the Atlantic Ocean. The localities are grouped round the Falkland Islands, Palmer Archipelago, South Georgia, Elephant and Clarence Islands, and Tristan da Cunha, which latter locality is the most northerly for the genus *Scalpellum* in this collection. These species therefore belong to the so-called Antarctic and sub-Antarctic regions of which the limits are not uniformly regarded by different authors. By some, e.g. Weltner, the northern limit for the sub-Antarctic is set at 40° S, a very unnatural limit, and not in agreement with the principles of modern zoogeography. By later authors, South Africa, South Australia and New Zealand are not held to belong to the sub-Antarctic region. In consequence of this lack of uniformity it is difficult to determine how many species of *Scalpellum* are known from the Antarctic and sub-Antarctic regions. Some species are known also from parts near to the northern limit here mentioned, and if these are included about twenty-six species of *Scalpellum* are known from both these regions.

It is not possible to decide whether they are distributed over the whole area in which the Discovery material was collected, as only a few finds of each species are known. Of these twenty-six species, only three were rediscovered by the Discovery expedition, namely, *S. gibberum*, C. W. Aurivillius, 1892, *S. africanum*, Hoek, 1883, and *S. convexum*, Nilsson-Cantell, 1921, all from previously known localities. As the other three species are new to science, we must admit that our knowledge of the Cirripedes from these parts of the ocean is incomplete. Since some, such as *S. elongatum*, Hoek, 1883, are known also from New Zealand waters, it is possible that others have a wider distribution. *S. ventricosum*, Hoek (1907), 1913, noted by me from the Atlantic Ocean (50° 11′ S, 50° 50′ W) was first described from a more northern and eastern locality (10° 35·6′ S, 124° 11·7′ E). If other species have such a wide distribution the number of species mentioned above may be much greater. At present, I think it is impossible to give a complete discussion of the distribution of these South Atlantic species of *Scalpellum*. The details of the distribution of the genera in this collection are given under the descriptions of the species. A comparison may here be made between the species with regard to the depth at which they were found. (Table overleaf.)

The first eight species in this table are pelagic, occurring on animals and floating objects. The substrata are discussed in detail in the systematic part of this paper. Of the remainder, most were taken from the littoral belt if, in accordance with many authors, we put the limit for this zone at 200 m., and not 400 m. as is done in many works on Cirripedes. Surely many occur in the abyssal zone also. For instance, *S. convexum*, Nilsson-Cantell, 1921, is here noted from 110–236 m. and in the type description from 310 m. *H. corolliforme* is here taken from 200 m., but was first described from a specimen from deeper water (274 m.). The three new species of *Scalpellum* are from depths greater than 200 m.

Many of the species here collected are well known. Still, the collection is of biological and embryological interest. Of some species of *Lepas*, *Scalpellum* and *Coronula*, rich material was brought home, including young stages. I have followed the principles applied

Bathymetrical distribution

Name of species	Depth at which taken
Lepas anatifera	Floating
,, *australis*	,, (down to 46 m.)
Conchoderma auritum	,,
,, *virgatum*	,,
Coronula diadema	,,
,, *reginae*	,,
Xenobalanus globicipitis	,,
Balanus maxillaris	,,
Elminius kingi	0–2 m.
Balanus laevis	0–109 m.
Scalpellum gibberum	74–156 m.
,, *africanum*	80–140 m.
,, *convexum*	110–236 m.
Hexelasma corolliforme	200 m.
Scalpellum liberum, n.sp.	259 m.
,, *magnae-carinae*, n.sp.	259–315 m.
,, *angulare*, n.sp.	342 m.

in modern works, and have given figures and descriptions of as many young and old stages as possible for the same species. If this is done for many species it will be much easier to determine new finds of Cirripedes. During my studies of the different stages I have found the actual form of the plates to be very different during development. It seems to me very questionable if all species described in the literature, especially of *Scalpellum*, are good species. In many cases they have been found to represent only different stages of growth of the same species. Though many species in the collection were previously known, they are not all well known. *Scalpellum africanum*, Hoek, 1883, *S. convexum*, Nilsson-Cantell, 1921, and *Hexelasma corolliforme* (Hoek, 1883) have not before this been recaptured since the original descriptions were given. The systematic part, which here follows, contains, besides actual systematic data, biological and embryological details of interest.

SYSTEMATIC

Genus **Scalpellum**, Leach, 1817

Scalpellum gibberum, C. W. Aurivillius, 1892.

For synonymy see Nilsson-Cantell, 1921, *Zool. Bidrag Uppsala*, VII, p. 178.

St. 48. 3. v. 26. Port William, Falkland Islands. 105–115 m., s. sh. Gear **OTL**. Three very young specimens.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Island. 105–115 m., f.s. Gear **OTL**. Many specimens on the decapod *Eurypodius latreillei*; one small specimen on a Hydroid.

St. WS 73. 6. iii. 27. 51° 01′ 00″ S, 58° 54′ 00″ W. 121–130 m., f.d.s. Gear **OTC**. Some large and small specimens on a *Tubularia* colony. Gear **N 7–T**. One full-grown specimen on a Hydroid.

St. WS 79. 13. iii. 27. 51° 01′ 30″ S, 64° 59′ 30″ W. 132–131 m., f.d.s. Gear **OTC**. Some large and small specimens on Molgulids, which occurred in large numbers in the catch.

St. WS 80. 14. iii. 27. 50° 57′ 00″ S, 63° 37′ 30″ W. 152–156 m., f.d.s. Gear **N** 7–T. Some small specimens. **N** 4–T. One specimen on a Polyzoan.

St. WS 83. 24. iii. 27. 14 miles S 64° W of George Island, East Falkland Island. 137–129 m., f.gn.s. sh. Gear **N** 7–T. Three large specimens. **OTC**. Three small specimens on Hydroids.

St. WS 84. 24. iii. 27. 7½ miles S 9° W of Sea Lion Island, East Falkland Island. 75–74 m., c.s. sh. st. Gear **OTC**. One large specimen.

St. WS 85. 25. iii. 27. 8 miles S 66° E of Lively Island, East Falkland Island. 79 m. Gear **OTC**. Two full-grown specimens on Hydroids.

St. WS 92. 8. iv. 27. 51° 58′ 30″ S, 65° 01′ 00″ W. 145–143 m., f.d.s. st. Gear **N** 7–T. Two specimens.

Distribution. Pacific Ocean (according to Aurivillius uncertain), Atlantic Ocean south from La Plata, Patagonia, Magellan Strait, Falkland Islands, 18–156 m. This species, rediscovered near the Falkland Islands (Nilsson-Cantell, 1921) is here taken from nine stations grouped round those Islands, where the species seems to be richly represented. From equatorial and northern parts of the ocean no records are known.

Supplementary Description. This species has already been re-described by Nilsson-Cantell (1921). Since, however, the Discovery collection comes from nine different stations and includes a large number of young stages, some further remarks may be added. These young stages are very richly represented from St. 51. The youngest free stage was a pupa without valves. The metanauplius stage, which is to be found in the mantle cavity as the first development takes place there, has already been described by me as well as the pupa stage (Nilsson-Cantell, 1921). It is re-figured here so as to give a complete series of developmental stages (Fig. 1, *a*). The following young stages are new. In general we know little about the development of *Scalpellum*. Broch, who has studied both the species *Scalpellum stroemii* (1912) and *S. scalpellum* (1924), has added much to our knowledge. A comparison may here be of great interest.

In a paper on Scalpellids from the coast of Chile (Nilsson-Cantell, 1930) I have discussed some young stages of other species of *Scalpellum*, and have found that variability exists in the development of the valves. Broch also noted differences in the order of the appearance of the valves in the pupae of the two species *S. stroemii* and *S. scalpellum*.

The *second stage* of *S. gibberum* is represented by a pupa without valves (Fig. 1, *b*), and of this stage I found many individuals.

The *third stage* has the primordial valves and all the calcareous plates of the capitulum developed except the rostrum and rostral latera (Fig. 1, *c*). Among all these pupal stages I did not find any with less than eleven capitular valves. According to the theory of Broch there must have been a stage with only five primordial valves, representing an older phylogenetic stage. It is curious that among all these pupae no such form is present. It is possible that intermediate stages may exist, but this does not seem probable, judging from the present material. Variation exists, as is stated also by Broch.

In the *fourth stage* (Fig. 1, *d*) the rostrum and rostro-laterals appear. In this stage the calcareous plates are developed under and beyond the primordial valves. To the first

layer of the calcareous plates of the third stage a new layer is added. This new layer differs in structure from the first layer, which again is different from the primordial structure. In the figures this first layer of the plates is distinguished from the primordial

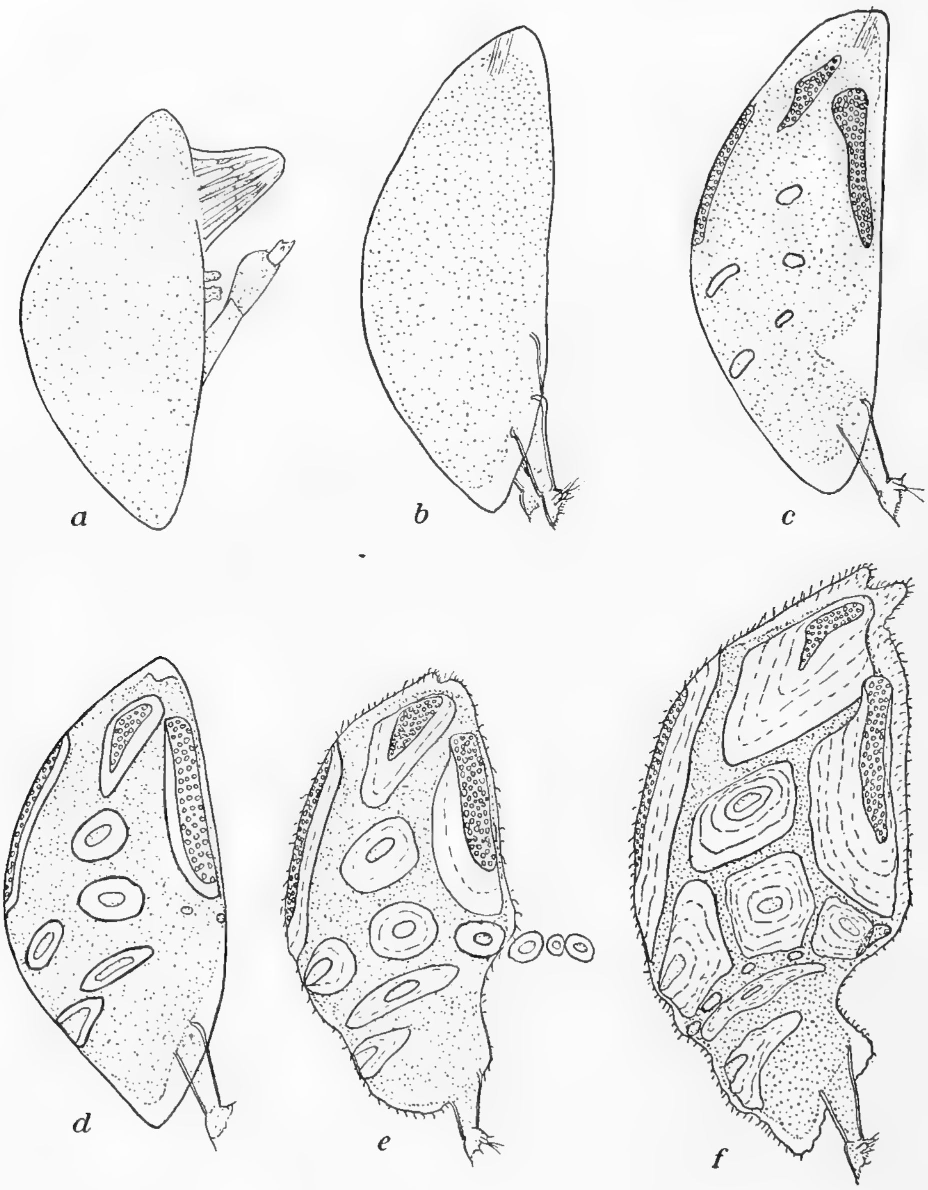

Fig. 1. *Scalpellum gibberum*. *a*. Metanauplius (total length 1·09 mm.). *b*. Pupa just attached (total length 1·23 mm.). *c*. Pupa with primordial valves, lateralia and dorsal scales of peduncle developed (total length 1·25 mm.). *d*. Somewhat older stage (total length 1·23 mm.). *e*, *f*. Young specimens (total lengths 1·23 and 1·52 mm. respectively).

valves. In no other species have I seen any differences in the structure in the first and later layers of the laterals; this fact does not seem to be of any phylogenetic importance, although I have thought it well to mention it. The rostrum and rostro-laterals appear in the fourth stage but, like the laterals of the third stage, they have only one layer.

In the *fifth stage* (Fig. 1, *e*) the pupa valves have been thrown off, and new calcareous layers have been added to all the plates. Thus the upper, inframedian and carinal laterals have three layers, but the rostrum and rostro-laterals, which appear at a later stage, have only two. In stages three to five the four dorsal scales are the only scales developed on the peduncle. The structure of these scales is the same as described for the laterals. They have in the third stage one layer, in the fourth two, and in the fifth three.

In the *sixth stage* (Fig. 1, *f*) the tentacle-like processes at the apex of the capitulum are more distinct than in the preceding stage. The capitular valves have additional layers and a shape more like the fully grown stage. The corners between the margins of the plates are now more distinct than in the fifth stage. Thus the upper latus is now quadrangular, the inframedian latus is pentagonal, and the rostral latus, carinal latus, and the rostrum are quadrangular. The umbo is central in all plates except the carinal latus. In the last-mentioned plate the umbo is first central (Fig. 1, *d*), but is later situated at the carinal margin. The peduncle is more developed, and new peduncle scales begin to appear between the first scales and the lower lateralia.

In the *seventh stage* (Fig. 2, *a*) the prehensile antennae of the pupal stage are still present. On the capitulum one can study the further changes in the position of the umbo and the shape of the valves. The umbo of the carina is further removed from the apex. In the upper latus the umbo becomes nearer to the apex, for the lower part of the plate is more developed. In the rostrum the umbo is sub-apical, in the rostral latus the umbo is situated near to the upper rostral corner, and in the inframedian latus the umbo is moved from a central to a sub-central position. In the carinal latus the umbo is placed as in the seventh stage. The tentacular processes have nearly disappeared. In the upper part of the peduncle new scales are visible.

In the *eighth stage* (Fig. 2, *b*) the prehensile antennae are totally lost, and the primordial valves have almost disappeared. The carina is angularly bent with the umbo above the middle. In the rostral latus the umbo is situated in the upper rostral angle, and in the inframedian latus the umbo is nearer to the basis. In other valves as in the eighth stage.

In the *ninth stage* (Fig. 2, *c*) the valves are close in shape to those of the fully grown stage, but some small differences exist. The occludent margin of the tergum is straight. The umbo of the carina is as in the eighth stage, but the lateral parts are more developed. The upper latus is transversely elongated, with an upper secondary part very distinct. The rostrum is quadrangular with a central umbo, and the visible part is triangular. The inframedian latus has now a basal umbo. The carinal latus is nearly the same as in mature specimens, with an umbo projecting behind the carina. In the peduncle a large number of new rounded scales are visible. All scales of the peduncle tend to become of a more rounded shape, but in the early stages, here figured, they are more transversely elongated.

The *tenth stage* (Fig. 2, *d*, *e*), which represents a fully grown animal, has a tergum with a convex occludent margin, a carina with a central umbo, an inframedian latus with a basal umbo and a more projecting carinal latus. The valves of the capitulum are

separated by wide chitinous interspaces, distinctly delimited. The peduncle has scales very different from those of the younger stages. The formation of scales in the peduncle is now ended. It is interesting to note that the scales are rather small and rounded, with a little point standing out from the cuticle.

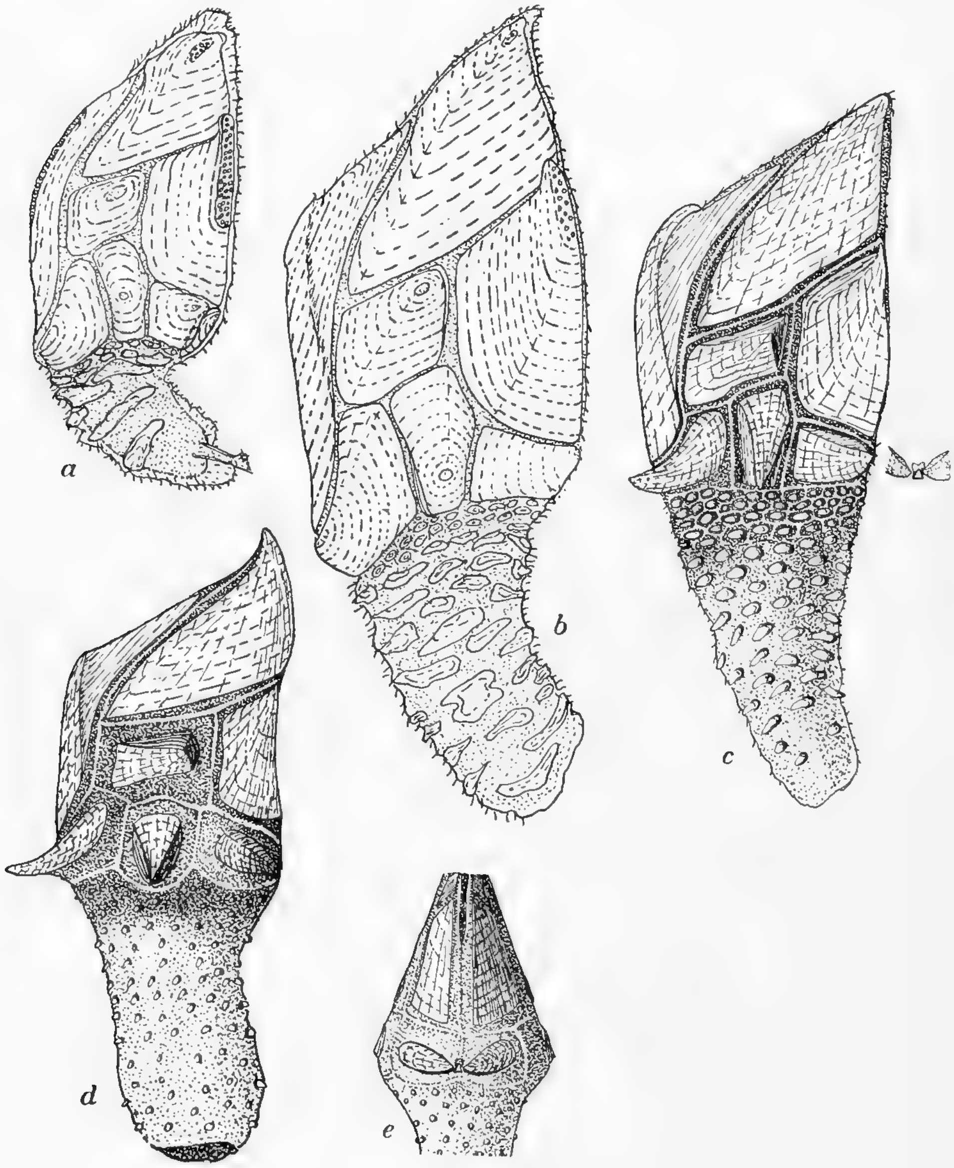

Fig. 2. *Scalpellum gibberum*. *a*, *b*, *c*. Young specimens (total lengths 2·30, 4·30, and 11 mm. respectively). *d*. Full-grown specimen, lateral view (total length 30 mm.). *e*. The same specimen, rostral view.

This comparison shows the importance of studying young and old stages of Cirripedes, especially those species with many plates, as in *Scalpellum*. Broch (1927) discussed the changes in the shape of the capitular plates during the ontogenetic development, a subject also mentioned by Nilsson-Cantell (1921). Accessory parts are added to the primary parts. A comparison is made by Broch between different species of *Scalpellum*.

It is of importance also to know the changes undergone during the ontogeny of a species, as here shown for *S. gibberum*.

My study of the young stages of certain species of *Scalpellum* brings out the fact that young specimens of many closely allied forms of *Scalpellum* are difficult to distinguish. Thus, I find that young stages of *S. gibberum* closely resemble those of *S. scalpellum* figured by Broch (1924). But, in the older stages, the differences become greater and greater, for the umbo of some plates, such as the scutum, has a different position. The primary part of the inframedian latus is very different in both these certainly allied species. The inframedian latus in the allied species *S. stearnsi*, Pilsbry, 1890, is of the same type as in *S. gibberum*, the primary part being triangular with a basal umbo. Pilsbry (1911) figures a stage of *S. stearnsi* much like the eighth stage here figured (Fig. 2, *b*). But *S. stearnsi* is in other plates, for instance the scutum, more like *S. scalpellum*. The differences in these three species seem to have arisen through the secondary development of the accessory parts of the plates, except in the inframedian latus. The scales of the peduncle are, in *S. scalpellum* and *S. stearnsi*, more different from the fully grown stage of *S. gibberum*, but by studying the young stages of this latter species, we have here seen that the scales were also originally transversely elongated.

Scalpellum liberum, n.sp.

St. 187. 18. iii. 27. Neumayer Channel, Palmer Archipelago. 64° 48′ 30″ S, 63° 31′ 30″ W. 259 m., m. Gear **DLH**. Three full-grown specimens situated on a Gorgonian.

Holotype. Zoological Department of the British Museum.

Diagnosis. *Female*. Capitulum with fourteen well-calcified plates, beautifully sculptured with growth lines and longitudinal lines. Scutum quadrangular, with straight occludent margin, and projecting apex. Tergum large, triangular, with bowed margins. Carina regularly bent; dorsal roof convex in the middle, with indistinctly indicated lateral ridges. Upper latus triangular, with apical, projecting umbo. Rostrum triangular, umbo apical. Rostral latus triangular. Inframedian latus triangular, with apical umbo, the upper part of the plate projecting freely. Carinal latus triangular, with much projecting apical umbo. Peduncle well developed, with very large triangular scales regularly covering the whole surface. Mandible with three teeth and an inner angle divided into two pectinated teeth. Maxilla I with a very small notch. Maxilla II with bristles in two groups. Caudal appendage single-jointed, without bristles, of the same length as the proximal segment of the protopodite.

Complemental male sack-like, without valves but with a distal projection with rudiments of cirri.

Description. This beautiful species is well distinguished from the known species. It is more nearly related to *S. velutinum*, Hoek, 1883, in the shape of the carinal latus, and consequently belongs to the group of *S. velutinum*, Pilsbry, 1907. I have named this new species *S. liberum* from the very typical freely projecting inframedian latus.

Of this species two young stages were found. The *first* (Fig. 3, *a*) is a pupa without any traces of the valves. The prehensile antennae are typical for *Scalpellum*.

The *second stage* (Fig. 3, *b*) shows an individual with all the capitular valves and the first four scales of the peduncle formed. The upper latus was originally quadrangular. The lower latera have not reached the development of the mature stage. They are all rather low triangular plates. The prehensile antennae are not lost in this stage.

Female. Capitulum with fourteen plates, all well calcified and separated by very small chitinous interspaces. The cuticle in the fully grown specimens is very thin and without hairs. The middle part of the animal, especially the upper part of the peduncle, is swollen, as is the case in many old individuals of *Scalpellum*. All plates with very distinct growth ridges and longitudinal striations. Thus the species is beautifully striated.

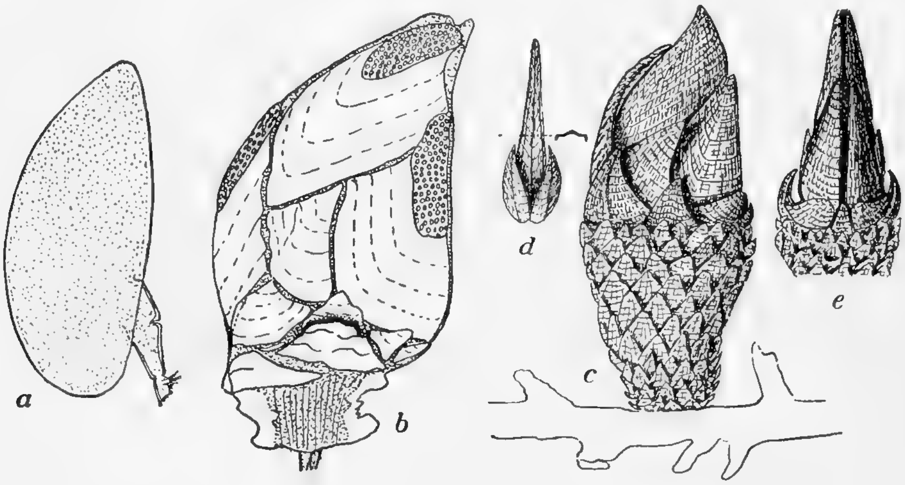

Fig. 3. *Scalpellum liberum*. *a*. Pupa without valves (total length 0·75 mm.). *b*. Young specimen which has not lost prehensile antennae (total length 1·30 mm.). *c*. Holotype, lateral view (total length 11 mm.). *d*. Carina and carinal latera. *e*. Holotype, rostral view.

Scutum quadrangular, with the occludent margin straight and the apex projecting freely. The lateral margin comparatively short.

Tergum triangular, with recurved apex. All margins bowed.

Carina simply curved, with an apical umbo. Lateral parts developed in the upper part of the plate. The dorsal roof convex in the middle, with very indistinctly indicated lateral ribs. The same shape of carina is to be found in typical *S. velutinum*, Pilsbry, 1907.

Upper latus in fully grown specimens triangular, with umbo apical and distinctly projecting. The scutal margin a little concave.

Rostrum well developed in comparison with the rostrum in *S. velutinum*, Pilsbry, 1907, and triangular in shape with the umbo at the apex. The valve is much like the scales of the peduncle, and not overlapped by the rostral latera.

Rostral latus triangular and nearly as high as wide.

Inframedian latus triangular and about as wide as high. It is very characteristic that, in this new species, the upper part of the plate in the fully grown female projects freely (Fig. 3, *c*, *e*).

Carinal latus triangular, with the umbo at the projecting apex, situated very high. A median ridge extends from the apex.

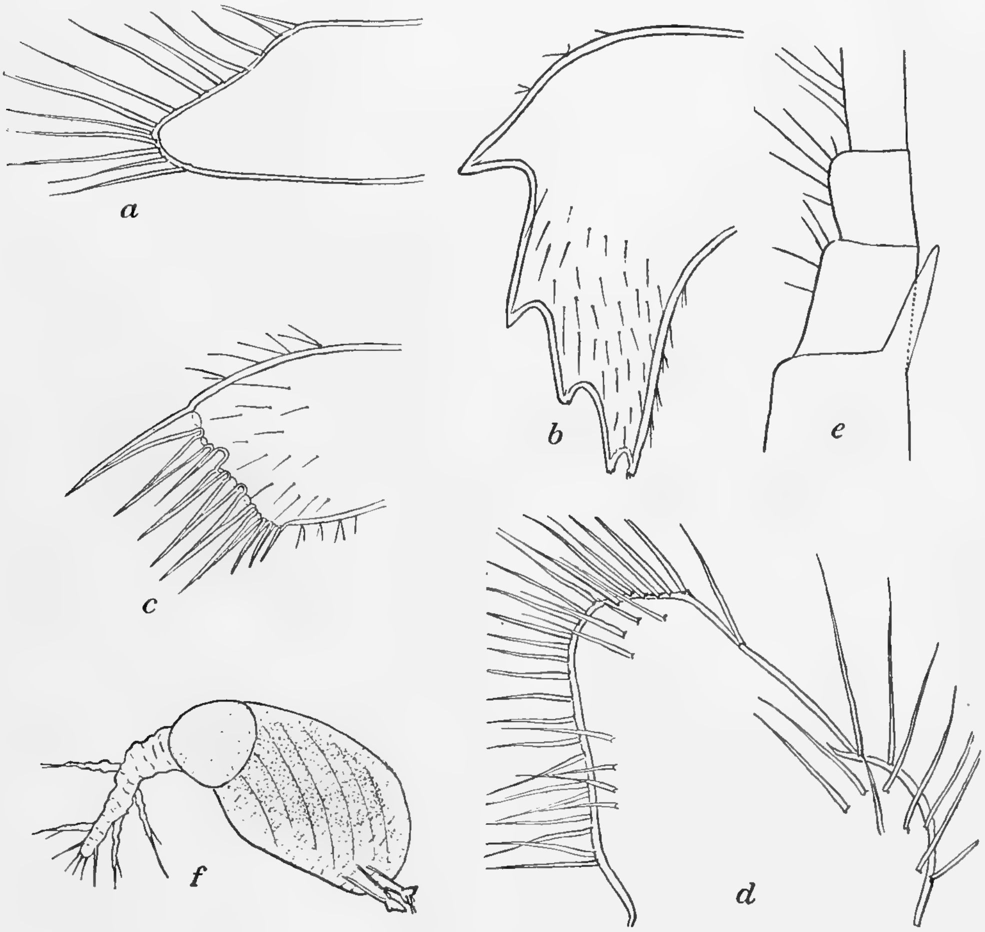

Fig. 4. *Scalpellum liberum*. *a*. Palpus. *b*. Mandible. *c*. Maxilla I. *d*. Maxilla II. *e*. Cirrus VI and caudal appendage. *f*. Complemental male, holotype (total length 0·85 mm.).

Peduncle well developed, of about the same length as the capitulum. A prominent feature is the great development of the scales which very regularly cover the whole surface. They are triangular in shape, rather like the rostral latus and the rostrum, but smaller. In no other species of *Scalpellum* have I seen such strongly developed scales. Probably this is a primitive feature if we maintain the old Darwinian opinion, for which T. H. Withers has recently (1928) produced palaeontological evidence, that *Pollicipes* and *Scalpellum* with many plates represent ancient forms. *Pollicipes mitella* (Linné, 1767) has a peduncle closely covered by large scales, which are nevertheless different from those of *S. liberum*.

Measurements in mm.

	Length of capitulum	Breadth of capitulum	Length of peduncle	Breadth of peduncle
Holotype	6	4·5	5	3·5
Paratype	5·5	3·5	5	2

Mouth-parts: Labrum concave, without teeth in the dissected specimen. Palpus conical, rather blunt, with long bristles at the point and on one margin. Mandible with three teeth and an inner angle divided into two somewhat pectinated points. Maxilla I has the lower corner of the front edge blunt. A little notch is situated in the upper half of the front edge. The first spine is strongest, and smaller ones are situated at the lower corner. Maxilla II with the front edge without a notch, and with a continuous row of bristles. A posterior lobe with bristles is differentiated. Behind this lobe is a small maxillary lobe (not indicated in the figure).

Number of segments of the cirri of the Holotype

Cirrus	I		II		III		IV		V		VI		Caudal appendage
Segments	6	8	11	12	12	12	12	12	12	13	13	14	1

Cirrus I much shorter than the other cirri, with rami of unequal length. The shorter ramus is about one-third of the longer.

Cirri II–VI have rami of equal length. Cirrus II is somewhat shorter than the following. Cirrus VI with three pairs of spines on the front edge of the segments.

The caudal appendage is single-jointed, without any traces of bristles. It is of the same length as the proximal segment of the protopodite.

Complemental male. On the inside of both scuta a complemental male was found. One of these is figured (Fig. 4, *f*). It is difficult to make out the finer details as the male is enclosed in a part of the mantle. The male is of the sack-like type without any traces of valves. Near the one pole the two prehensile antennae are situated. At the opposite pole a small lobe is differentiated. From this part a long projection is formed, on the top and sides of which are some bristles. This is of interest as the same is found in *S. gibberum* (Nilsson-Cantell, 1921, p. 184, text-fig. 25, *f*). The contours of the testis can be traced. The sack is provided with muscular bands as in other males, but these are only indicated in this figure. The surface is covered with very small spines.

Scalpellum magnae-carinae, n.sp.

St. 187. 18. iii. 27. Neumayer Channel, Palmer Archipelago. 64° 48′ 30″ S, 63° 31′ 30″ W. 259 m., m. Gear **DLH**. One specimen, destroyed.

St. 190. 24. iii. 27. Bismarck Strait, Palmer Archipelago. 64° 56′ 00″ S, 65° 35′ 00″ W. 315 m., m. r. Gear **DLH**. Two specimens, one selected as holotype.

HOLOTYPE. Zoological Department of the British Museum.

Diagnosis. *Female.* Capitulum hairy, with fourteen well calcified plates, separated by chitinous interspaces, the valves sculptured. Scutum quadrangular, apex recurved and occludent margin convex. Tergum triangular, with nearly straight occludent margins. Carina regularly bowed with apical umbo. Dorsal roof strongly convex. Upper latus pentagonal with apical umbo. Rostrum triangular with apical umbo. Rostral latus quadrangular, wide rather than high. Inframedian latus triangular with apical umbo. Carinal latus quadrangular with apical umbo. Peduncle with transversely elongated scales with chitinous interspaces. Mandible with three teeth and a pectinated inner angle. Maxilla I with an indistinct notch. Maxilla II with bristles in two groups. Caudal appendage single-jointed, with bristles, of the same length as the proximal segment of the protopodite of cirrus VI.

Discussion and Description. This new species, which I have named *S. magnae-carinae*, from the large and well-developed carina, belongs, like *S. liberum*, n.sp., to the group of *S. velutinum*. From this species it is well differentiated by several external and internal characters. In the shape of the carinal latus it is much related to *S. regium*, Wyv. Thomson, 1873, *S. moluccanum*, Hoek, 1883, and *S. gigas*, Hoek, 1883, of the Challenger Expedition. These species I have studied in the British Museum, and have found them in other characters well separated. In the internal parts this new species differs especially by the single-jointed caudal appendage. In *S. regium* the appendage is four-jointed (according to Hoek); in *S. gigas* I found in the type material four to six segments; in *S. moluccanum* the appendage has five to six segments (Hoek, 1883, and Nilsson-Cantell, 1927).

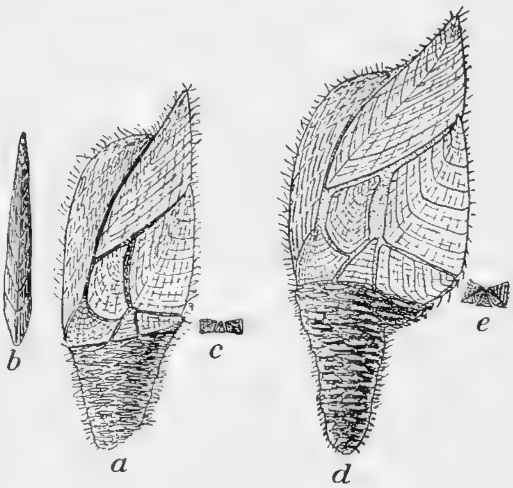

Fig. 5. *Scalpellum magnae-carinae*. *a*. Holotype, lateral view (total length 19 mm.). *b*. Carina. *c*. Rostrum and rostral latera. *d*. Paratype (St. 187), lateral view (total length 30 mm.). *e*. Rostrum and rostral latera.

Female. Capitulum wholly covered by a thick and very hairy cuticle, and this must first be removed before one can study the valves. There are fourteen plates separated by chitinous interspaces, sometimes rather widely as in the larger individuals, especially round the upper latus. The valves are distinctly sculptured by growth ridges and longitudinal radiating lines.

Scutum quadrangular, with recurved umbo, occludent margin slightly convex.

Tergum triangular, with the apex acute, occludent margin like the others a little convex.

Carina very typical, rather broad and regularly arched. Umbo apical. Dorsal roof very convex, without lateral ribs, and merging into the well-developed sides.

Upper latus pentagonal, with the umbo at the apex. The scutal margin, which is the longest, hollowed out, the carinal margin convex.

Rostrum triangular, rather small, with the umbo at the apex, not overlapped by the rostral latera.

Rostral latus quadrangular, wide rather than high, with the umbo at the upper rostral corner.

Inframedian latus triangular, with the umbo at the apex.

Carinal latus quadrangular with the umbo also at the apex. Upper margin hollowed out; carinal margin convex.

Peduncle shorter than the capitulum, with transversely elongated scales separated by chitinous interspaces. The cuticle with many hairs.

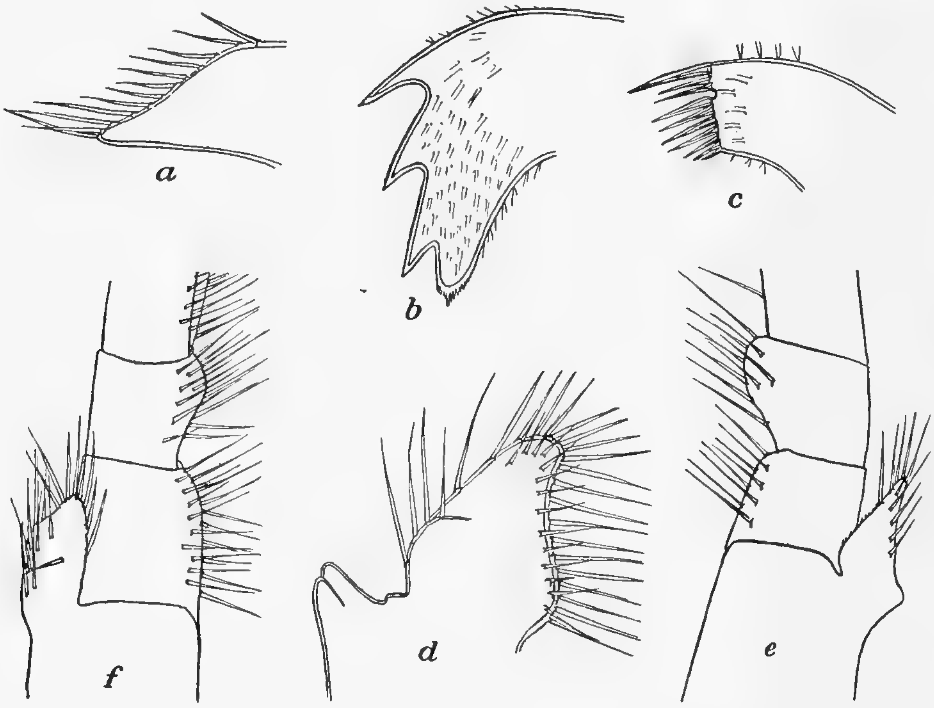

Fig. 6. *Scalpellum magnae-carinae*. *a*. Palpus. *b*. Mandible. *c*. Maxilla I. *d*. Maxilla II. *e*. Cirrus VI and caudal appendage of holotype. *f*. Cirrus VI and caudal appendage of paratype.

Measurements in mm.

	Length of capitulum	Breadth of capitulum	Length of peduncle	Breadth of peduncle
Holotype	13	8	6	4
Paratype	19	14	11	6

Mouth-parts: Palpus conical, pointed and with bristles along one edge. Mandible with three teeth and a pectinated inner angle. Maxilla I with straight front edge: a very small, sometimes barely developed notch, can be traced on the front edge. Maxilla II with bristles along the whole concave front edge. In the posterior part a small lobe with bristles is differentiated. Behind this is a large maxillary lobe with the opening for the maxillary gland.

Number of segments of the cirri

	I		II		III		IV		V		VI		Caudal appendage
Holotype	6	11	13	14	14	15	15	17	16	17	17	18	1
Paratype	6	11	13	17	—	15	—	—	—	—	—	—	1

Cirrus I with rami of different lengths. Cirrus II also with unequal rami, shorter than the following cirri, in which the rami are equal. Cirrus VI with six pairs of spines on the front edge of the segments.

The caudal appendage is single-jointed, broad and flat and covered with many bristles. The appendage is of the same length as the proximal segment of cirrus VI. In the paratype it is even shorter (Fig. 6, *f*).

The *complemental male* could not be studied here. Probably it is of the reduced sack-like type.

Scalpellum angulare, n.sp.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island. 61° 25′ 30″ S, 53° 46′ 00″ W. 342 m., r. Gear **DLH**. Young and old individuals situated on a Tunicate.

Holotype. Zoological Department of the British Museum.

Diagnosis. *Female.* Capitulum with fourteen plates and very small interspaces. Growth lines well marked. Surface with strongly curved hairs. Scutum quadrangular, occludent margin straight. Tergum large, triangular. Carina regularly bent, umbo apical; dorsal roof somewhat concave. Upper latus pentagonal; umbo apical. Rostrum triangular with the umbo apical. Rostral latus high. Inframedian latus with a triangular primary part and a secondary upper part, both forming an obtuse angle seen from the side. Umbo apical at first, but later sub-apical. Carinal latus pentagonal; umbo projecting much beyond the carina. Peduncle with transversely elongated scales and curved hairs. Mandible with three teeth and a small pectinated inner angle. Maxilla I with a notch. Maxilla II with the bristles in two groups. Caudal appendage single-jointed without bristles, shorter than the proximal segment of the protopodite.

Complemental male sack-like, without cirri and valves.

Discussion and Description. These individuals represent a new and distinct species of *Scalpellum*, well distinguished from other species by the very peculiar inframedian latus. Even when fully grown the species does not seem to attain a large size. Of the known species of *Scalpellum*, in my opinion the following are most closely related to this species: *S. brevecarinatum*, Hoek, 1883, *S. micrum*, Pilsbry, 1907. I have named this new species *S. angulare* from the curious, angularly bent inframedian latus.

Two young stages were found in this material. They are figured here. The *first stage* (Fig. 7, *f*) has all plates of the capitulum well developed. The peduncle has the first four basi-dorsal plates formed. The lower latera are different from those in the fully grown specimen. They have not reached the height of the mature stage.

The *second stage* (Fig. 7, *g*) shows the plates a little more developed. The carinal latus has not reached the mature shape, for the umbo does not project so much. The inframedian latus is still triangular, with no trace of the secondary part; consequently the umbo is situated at the apex. The dorsal roof, in these young stages, is convex without

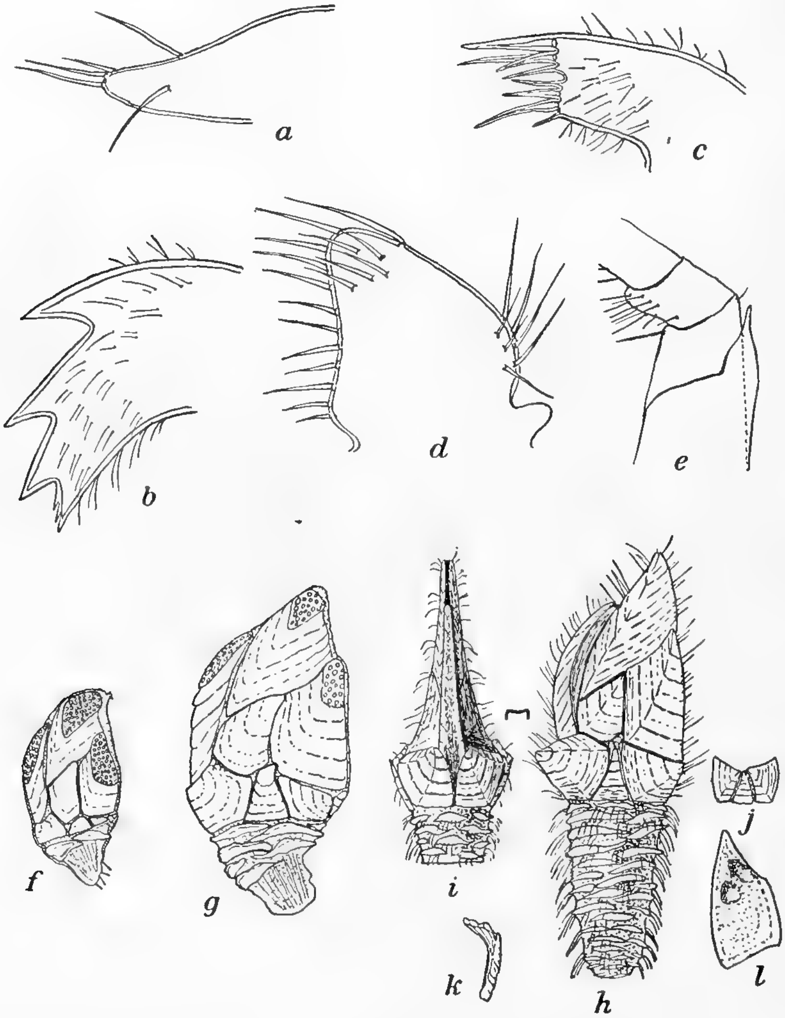

Fig. 7. *Scalpellum angulare*. *a*. Palpus. *b*. Mandible. *c*. Maxilla I. *d*. Maxilla II. *e*. Cirrus VI and caudal appendage. *f*, *g*. Young specimens (total lengths 0·84 and 1·68 mm. respectively). *h*. Holotype, lateral view (total length 7·5 mm.). *i*. Carinal view. *j*. Rostrum and rostral latera. *k*. Inframedian latus from the side. *l*. Left scutum, internal view showing the depressions for the depressor muscle (below) and for the complemental male.

traces of the indistinctly developed lateral ridges of the fully grown stage. The tentacle-like organs of the capitulum seen in the first stage have already disappeared. On the peduncle many scales have been formed.

Female. Capitulum covered by a hairy membrane. The hairs are very strong, sometimes regularly curved, a feature I have never seen in other species. Valves fourteen in number, rather thick, separated by very narrow chitinous interspaces. The growth-lines in this species are well marked and placed rather far from each other.

Scutum quadrangular with a straight occludent margin. Tergal margin hollowed out.

Tergum triangular, rather large, with the occludent margin convex. Carinal margin concave in the upper part and convex in the lower.

Carina regularly bent with the umbo apical. Dorsal roof somewhat concave, with very indistinctly indicated lateral ridges; the sides are well developed.

Upper latus pentagonal, with the tergal and scutal margins longer than the other sides, of which the carino-lateral and basal margins are the longest. Umbo situated at the apex.

Rostrum well developed, triangular, with the umbo at the apex. The plate is not covered by the rostral latera.

Rostral latus as high as wide, with a ridge extending from the umbo to the opposite corner.

Inframedian latus of very typical shape. It consists of a primary part, which is triangular, with the umbo at the top, and a later formed secondary or accessory upper part. The umbo is thus in fully grown specimens sub-apical. The plate, seen from the side (Fig. 7, *k*), is bowed, the two parts forming an obtuse angle.

Carinal latus of very typical shape, pentagonal, with the umbo projecting outwards beyond the carina. From the umbo two ridges can be traced; the plate is therefore divided into three triangular areas. Basal margin very short. All margins straight, except the lateral, which is convex.

Capitulum swollen in the lower part. The mantle cavity in the dissected specimen was filled with eggs in development. No Cypris stages were found in the specimen, but there is a great possibility that the first development takes place in the mantle cavity.

Peduncle somewhat shorter than the capitulum. The surface is covered with distinctly separated transversely elongated scales. Cuticle hairy; the hairs are strong, and are curved towards the base of the peduncle.

Measurements in mm.

	Length of capitulum	Breadth of capitulum	Length of peduncle	Breadth of peduncle
Holotype	4·5	3	3	1·5
Paratype	7·5	3·5	3	2

Mouth-parts: Palpus conical with few bristles. Mandible with three teeth, and an inner angle with a few finer teeth. Maxilla I with a small notch at the middle of the front edge. Maxilla II with a continuous row of bristles on the front edge. A posterior lobe with bristles is differentiated. Behind this a small maxillary lobe is formed.

Number of segments of the cirri of the Holotype

Cirrus	I		II		III		IV		V		VI		Caudal appendage
Segments	5	6	8	9	9	10	10	11	11	11	11	11	1

Cirrus I short with nearly equal rami. Cirrus II shorter than the following cirri, with rami unequal in length. The segments in the longer cirri have three pairs of spines on the front edge of the segments.

Caudal appendage single-jointed, conical, without bristles. The appendage is shorter than the proximal segment of the protopodite.

The *complemental male* is of the sack-like type without any traces of valves. The male was situated in a very distinct pit on the inside of the scutum near the apex (Fig. 7, *l*).

Scalpellum africanum, Hoek, 1883.

Hoek, 1883, *Challeng. Rep.* VIII, p. 87.
Gruvel, 1905, *Monogr. Cirrhip.* p. 62.

St. 6. 1. ii. 26. Tristan da Cunha. 80–140 m., r. Gear **DL**. Six specimens on corals.

DISTRIBUTION. This species was described by Hoek (1883) from Tristan da Cunha, the same place from which the Discovery material was taken.

DISCUSSION. Three closely related species, *S. africanum*, Hoek, 1883, *S. triangulare*, Hoek, 1883, and *S. botellinae*, Barnard, 1924, have been described, and these have been held by me to be, possibly, synonyms. The first two mentioned are grouped by Hoek in two different sections of the genus, for he said that the rostrum is present in *S. africanum* and absent in *S. triangulare*. As I have been able to study the types of both, it was possible to find much external agreement between the two species, and at first I thought that *S. africanum* represented a young individual of *S. triangulare*. But by studying the internal parts I found certain differences, so it is, at present, inadvisable to unite them.

The species *S. botellinae* is also close to *S. africanum*, even in the mouth-parts, but other differences exist, for while the complemental male of *S. botellinae* has four valves, that of *S. africanum*, as seen from this material, has none.

SUPPLEMENTARY DESCRIPTION. One young stage (Fig. 8, *j*) with calcified plates was studied. Of the lower latera the rostrum, the rostral and the carinal latera are developed but rather small. Of the inframedian I was unable to find any trace. The primordial plates are very distinct and of a peculiar perforated structure, as is also found in *S. eumitos*, Barnard, 1924. In other species of *Scalpellum* I have found these holes to be filled up. The tentacle-like process at the top of the capitulum is very distinct. On the peduncle there were the four large scales.

Female. The fully grown specimens were all covered by a thick hairy cuticle, which had to be removed before one could study the valves. To the description of the capitular valves nothing can be added to that given by Hoek.

Scutum quadrangular with rather convex umbo and recurved apex.

Tergum triangular with convex occludent margin and recurved apex.

Carina regularly bent, with the umbo at the apex. Dorsal roof convex. Sides well developed with wide areas in the upper part.

Upper latus quadrangular with the carinal margin shorter than the others, which are nearly equal in length.

Rostrum triangular with apical umbo.

Rostral latus quadrangular with short basal margin. The plate wider than high.

Inframedian latus triangular with apical umbo.

Carinal latus pentagonal with the umbo at the middle of the carinal margin. Lateral, upper and basal margins nearly of the same length.

Peduncle shorter than the capitulum, with large transversely elongated scales.

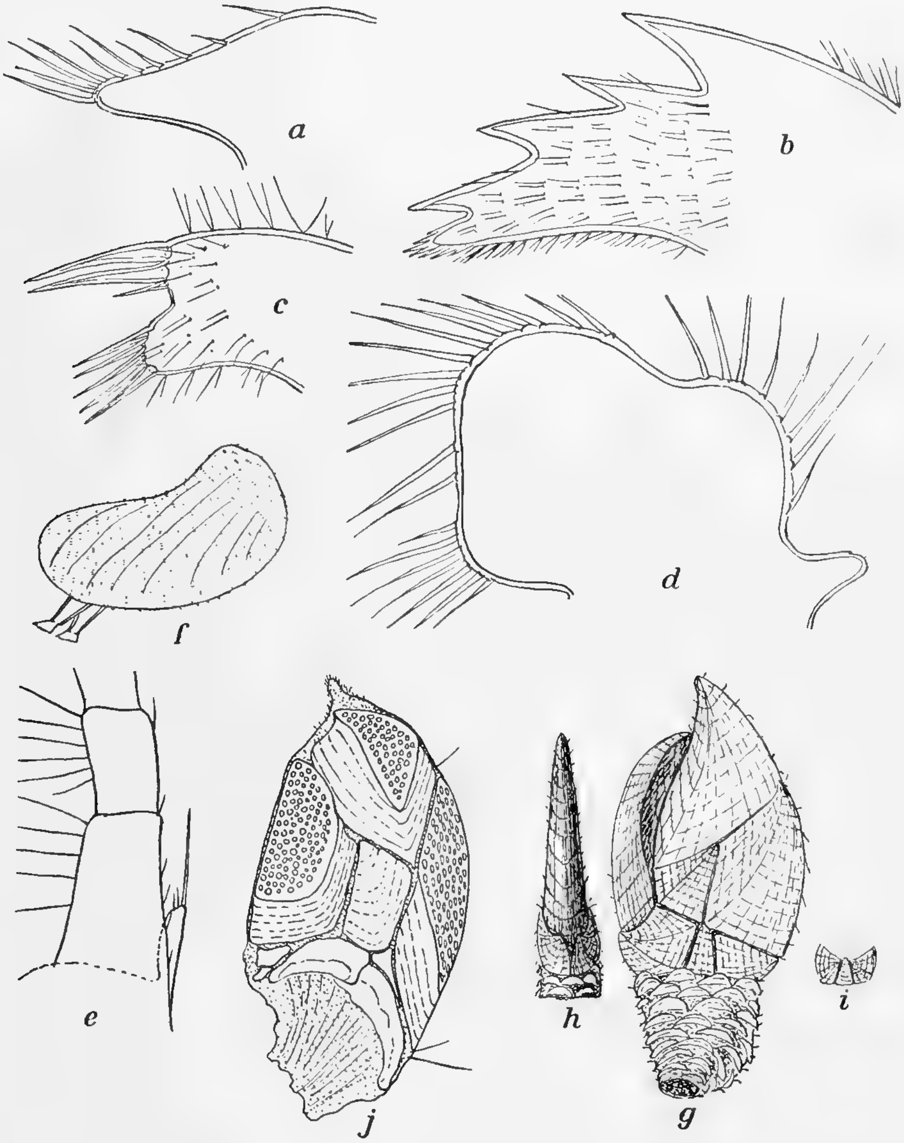

Fig. 8. *Scalpellum africanum*. *a*. Palpus. *b*. Mandible. *c*. Maxilla I. *d*. Maxilla II. *e*. Cirrus VI and caudal appendage. *f*. Complemental male (total length 0·62 mm.). *g*. Full-grown specimen, lateral view (total length 7 mm.). *h*. The same specimen, carinal view. *i*. Rostrum and rostral latera. *j*. Young specimen (total length 1·50 mm.).

The measurements of the dissected specimen are: length of capitulum 4 mm., breadth 2 mm.; length of peduncle 3 mm., breadth 2 mm.

As the internal parts have not previously been studied, figures and descriptions are given here.

Mouth-parts: The mouth-parts of the Discovery material agree well with those of Hoek's type-material, in which, in spite of their bad state of preservation, it was possible to see them. Palpus conical, rather pointed, with spines at one side and at the point. Mandible with four teeth and a pectinated inner angle. Maxilla I with a broad and distinct notch without bristles; above the notch are stronger spines. Maxilla II broad, with no notch on the middle of the front edge. A posterior lobe with bristles is differentiated. Behind this is a small maxillary lobe.

Number of segments of the cirri of the dissected specimen

Cirrus	I		II		III		IV		V		VI		Caudal appendage
Segments	7	9	13	14	14	15	17	17	16	17	17	17	1

Cirrus I with rami unequal in length. The other cirri with rami sub-equal in length. The segments of the sixth cirrus with four pairs of spines on the front edge.

Caudal appendage short, with only one segment; one large bristle at the top. The appendage about half the length of the proximal segment of the pedicel of the sixth cirrus.

Complemental male (Fig. 8, *f*) of the sack-like type, without any traces of valves, smaller than in *S. botellinae*. The surface is minutely spinose, as in other males.

Scalpellum convexum, Nilsson-Cantell, 1921.

Nilsson-Cantell, 1921, *Zool. Bidrag Uppsala*, VII, p. 194.

St. 27. 15. iii. 26. West Cumberland Bay, South Georgia. 110 m., r. m. Gear **DL**. Two full-grown specimens on Hydroids.

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. 122–136 m., gn.m. st. Gear **OTL**. Many specimens of different ages on Gorgonians.

St. 156. 20. i. 27. 53° 51′ 00″ S, 36° 21′ 30″ W. 200–236 m., r. Gear **DLH**. Some smaller specimens on Gorgonians.

Distribution. South Georgia. The Discovery localities agree well with the localities of the type collected by the Swedish South Polar Expedition, 1901–3, also from South Georgia, in 110–310 m.

Discussion and Supplementary Description. This species, first described by me in 1921, is now found again in Antarctic regions. There are some species from the same parts of the ocean nearly related to this, namely *S. bouvieri*, Gruvel, 1906, and *S. weltneri*, Gruvel, 1907. I first thought that all three were the same species, but since I have compared the types with the present material I must affirm that they are all distinct species, though the differences are not very great. *S. bouvieri* was identified by Nilsson-Cantell (1926). As the figures of both species, *S. weltneri* and *S. bouvieri*, do not give an exact impression of the shape of the plates, I must here note that the species are very closely related in external characters. Both have the carina concave dorsally, more in the latter species than in the former. *S. convexum* differs from both distinctly in the strong dorsal convexity of the carina. Other differences in the plates also exist. *S. welt-*

neri and *S. bouvieri* are externally rather similar, but differences are to be found in the carino-laterals and the inframedian laterals. The finer structure of the plates which I

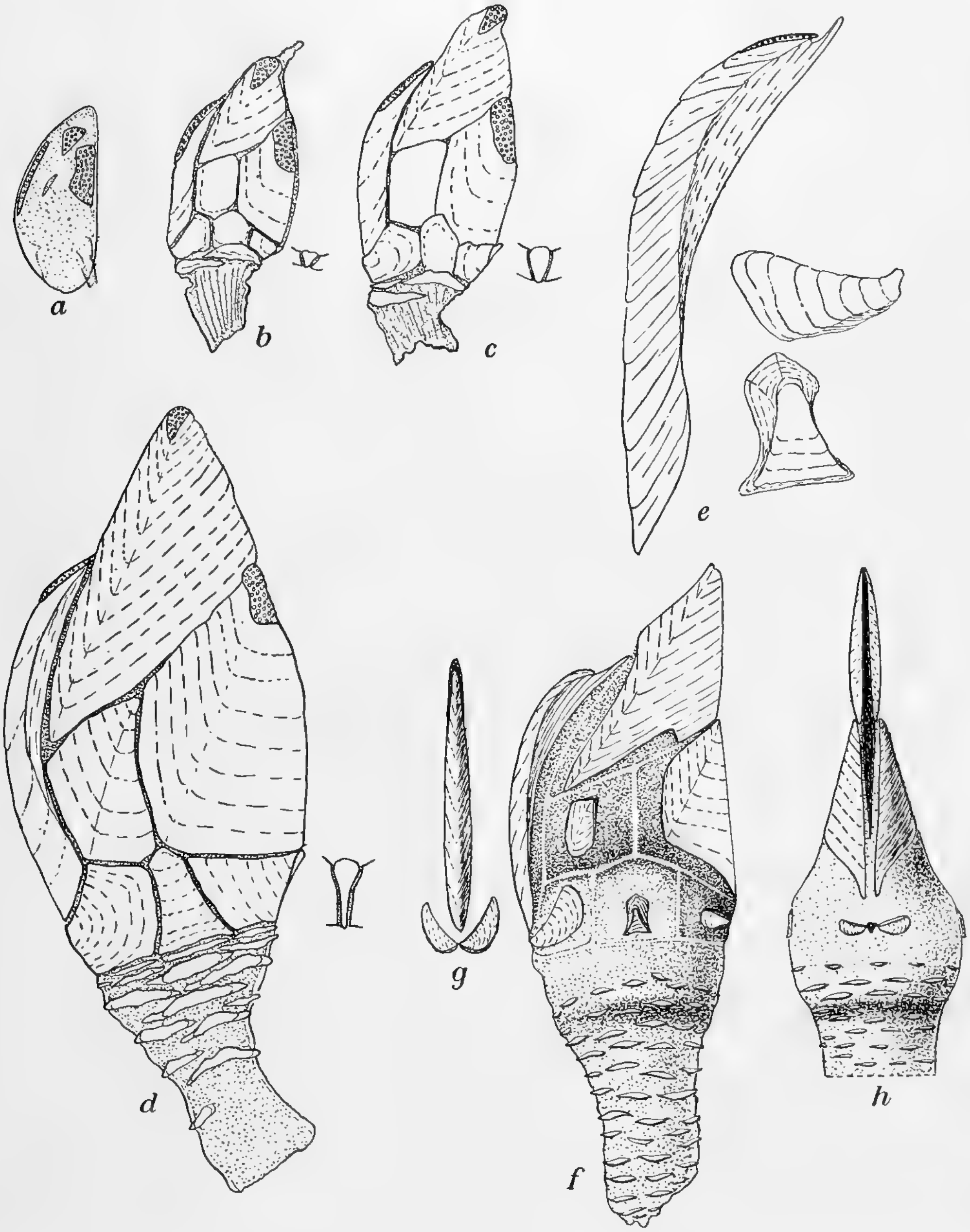

Fig. 9. *Scalpellum convexum.* *a.* Pupa with primordial valves and upper latus (total length 0·94 mm.). *b, c, d.* Young specimens (total lengths 1·50, 1·91, and 4·35 mm. respectively). *e.* Carina, inframedian latus and rostral latus of a young specimen (total length 5·62 mm.). *f.* Full-grown specimen, lateral view (total length 15 mm.). *g.* Carina and carinal latera. *h.* The same specimen, rostral view.

have determined by studying the types makes the differences greater than it is possible to see from figures only. *S. weltneri* has a very hairy cuticle and *S. bouvieri* a cuticle without hairs. They are thus all found to be good species.

As the Discovery material contains many young stages I can complete the description given by me in 1921, for young stages were not then known.

It is thus possible to show that the external shape of the valves varies much with the age. We must, consequently, know the different stages of development, especially of *Scalpellum* species, if we wish to bring order out of chaos. It is necessary in the future to figure already described species which have been re-identified.

The *first stage* (Fig. 9, *a*) in this collection is a pupa with the first primordial valves developed. Of the other valves a very small upper latus can be traced. Broch, 1912 and 1924, states that the upper latus is first developed after the five primordial plates in species of *Scalpellum*. No peduncle scales are to be seen as in the corresponding stage of *S. gibberum*, C. W. Aurivillius, 1892.

In the *second stage* here figured (Fig. 9, *b*) all the valves of the capitulum are formed. As no intermediate stages are represented we cannot indicate the order of the appearance of the plates. We see that the rostrum is originally of a triangular shape with the umbo at the base. On the peduncle the first four large scales are developed. The shape of the inframedian latus is more rounded than in the later, especially mature, stages. The processes, mentioned by Hoek and other authors in young *Scalpellum* at the apex of the capitulum, are very distinct.

In the *third stage* figured (Fig. 9, *c*) the valves of the capitulum are somewhat larger. The new scales of the peduncle appear in the region between the capitulum and the peduncle, according to Broch. The primordial plates as in the previous stage.

In the *fourth stage* figured (Fig. 9, *d*) the inframedian latus is more elongated by the upward growth of the sides which forms a small accessory part above the strong umbo. The scales on the peduncle are more developed in this stage.

Of the *fifth stage* (Fig. 9, *e*) three plates are figured. The inframedian latus has now reached its definite shape, and in the carina the umbo is removed from the apex.

Finally, to show the variation in the *fully grown stages*, I have figured an old specimen (Fig. 9, *f*, *g*, *h*), for comparison with that previously figured by me (1921, Fig. 29, *h*). In that stage all the plates are fully calcified, but separated by chitinous interspaces. The limits in the chitin show the same shape as the original plates, as in the first stages here figured. The calcified portions of the plates are, in some respects, different from the individual figured by me in 1921. Thus the tergum has the basal margin incompletely calcified. The other plates are smaller, and the interspaces wider, than in the young stages here figured. This may be due to the fact that the capitulum and the upper part of the peduncle are much swollen.

By dissecting the specimens I found a large number of Cypris stages, as the first development takes place in the capitulum (Nilsson-Cantell, 1921, pp. 101–5). The upper part of the peduncle is much expanded and, in consequence of this, it is without scales. Such an interspace is not to be found in younger specimens. Fig. 9, *h* from the rostral side shows the degree of deformation.

In the original description the rostrum is said to be long, with the umbo at the apex. From this material we can study the shape more precisely. First, it is triangular and becomes more and more elongated. The visible part is often narrow and long but the real shape is more nearly triangular. The umbo must be situated at the base, to judge from the young specimens (Fig. 9, *b*, *c*, *d*), as the plate in the upper part is often broader. The plate seems to me to be more and more reduced during ontogeny. By many species of *Scalpellum* the rostrum is totally lost.

Genus **Lepas**, Linné, 1767

Lepas anatifera var. a, Darwin, 1851.

Darwin, 1851, *Monogr. Lepadid.* p. 73.

22. xii. 25. Cape Town, from ship's side. Six specimens.

DISTRIBUTION. Cosmopolitan and pelagic on ships' bottoms, driftwood and other floating objects. Barnard (1924), who described the barnacles in the South African Museum, mentions only two *Lepas* species in the collection, namely *L. anserifera* (Table Bay and Algoa Bay) and *L. pectinata* (Durban).

DISCUSSION. By dissecting one individual, the presence of two filamentary appendages on each side could be established. The caudal appendages are rounded, and differ from those of *L. anserifera*. Externally there is much resemblance to this species. The internal parts are like those of *L. anatifera*, and they must therefore be described under this species. Of the six specimens all have an umbonal tooth on the right scutum, which is given as typical for this species. But in that respect there exist variations (Weltner, 1900, and other authors). As the specimens of this material have small depressed marks on the scutum and sometimes also on the tergum they agree well with the var. *a*, Darwin, 1851.

The measurements of the largest specimen are as follows: length of capitulum 20 mm., breadth 12 mm.; length of peduncle 12 mm., breadth 7 mm.

Lepas australis, Darwin, 1851.

Darwin, 1851, *Monogr. Lepadid.* p. 89.

St. 8. 8. ii. 26. 42° 36′ 30″ S, 18° 19′ 30″ W. Surface. Gear **NH.** Many specimens of different sizes on floating *Macrocystis*.

St. 63. 22. v. 26. 48° 50′ 00″ S, 53° 56′ 00″ W. Surface. Gear **NH.** Many smaller specimens on floating *Macrocystis*.

St. 212. 16. iv. 27. Drake Strait. 61° 15′ 00″ S, 64° 42′ 50″ W. Surface. Gear **NH.** Many full-grown specimens on floating *Macrocystis*.

St. 229. 4. v. 27. 53° 40′ 00″ S, 61° 10′ 00″ W. 46 (–0) m. Gear **N 100 H.** Many smaller specimens.

DISTRIBUTION. Pelagic with a wide distribution in the southern hemisphere. By Gruvel (1910) the species is held to have a cosmopolitan distribution. In the literature I have not found localities from the northern seas. As the present species is noted from

a very southern station near the South Shetlands, with rather cold water, the temperature is not a factor of very great importance in its distribution.

Supplementary Description. The species is represented in this collection by very typical specimens from four different stations. The specimens have umbonal teeth on both scuta, which is given as very characteristic for this species. The very closely related

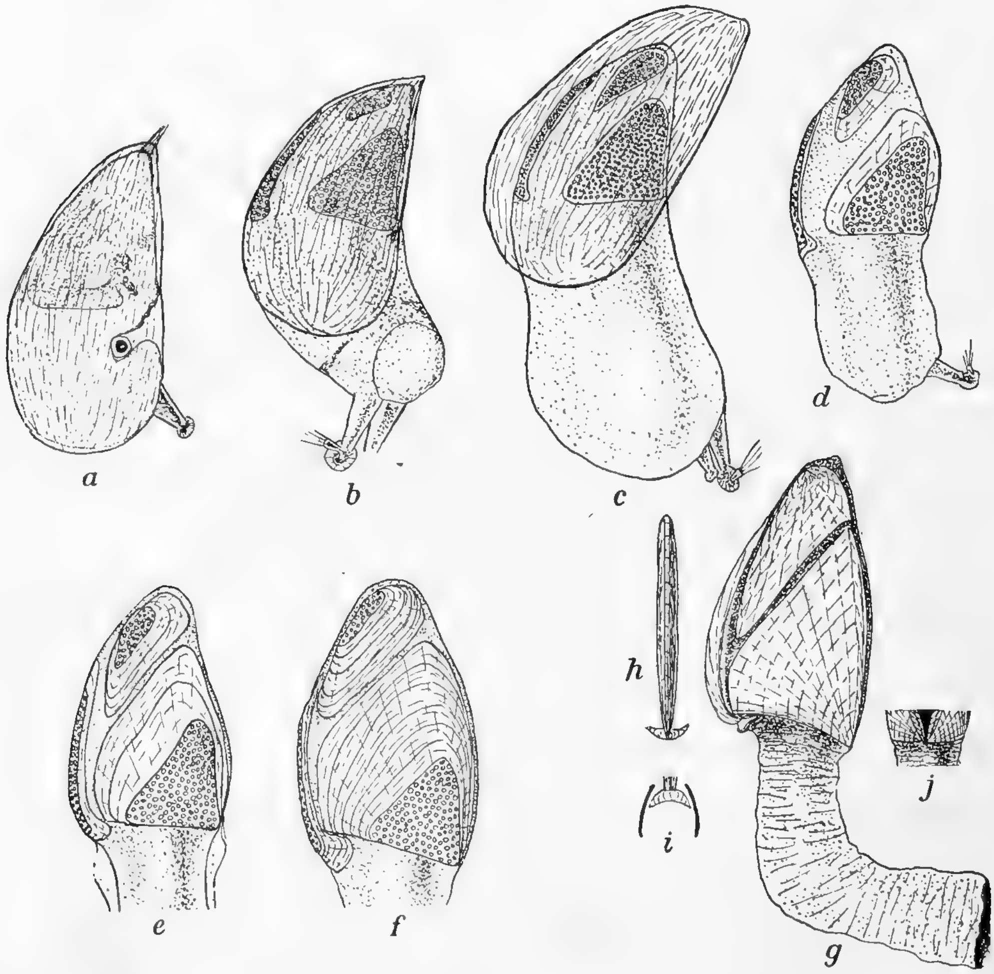

Fig. 10. *Lepas australis* (*a–f* from St. 63). *a*. Pupa (total length 2·55 mm.). *b*. Pupa with primordial valves and initial development of peduncle (total length 3·15 mm.). *c*. Young specimen just leaving the Cypris valves (total length 3·35 mm.). *d*, *e*, *f*. Young specimens with initial development of the calcareous plates (total lengths 3·55, 4·07, and 4·30 mm. respectively). *g*. Full-grown specimen from St. 212 (total length 64 mm.). *h*. Carina. *i*. Carina seen from beneath. *j*. Scuta, ventral view.

L. anatifera sometimes has umbonal teeth on both scuta, but there is yet a difference, for in *L. australis* the scuta are more curved in the umbonal part. It may here be pointed out that these teeth can also disappear during ontogeny, as I have found in some specimens from Juan Fernandez Islands. They were described as var. *weltneri* (Nilsson-Cantell, 1929). But, in typical *L. australis*, there is no variation in the teeth of the scuta as in *L. anatifera*. As other good characters for *L. australis* may be mentioned the very thin plates of the capitulum and the well-developed prongs on the carina.

According to Darwin (1851), *L. australis* is very closely related to *L. fascicularis*. In my opinion, this latter species is distinct from all other species by the very different carina, and it differs from *L. australis* by the presence of five filamentary appendages. I think *L. australis* is most related to *L. anatifera*.

The material contains individuals of all stages from pupae without any traces of plates to fully grown specimens. From St. 8 a very large individual was taken with the following measurements: length of capitulum 38 mm., breadth 25 mm.; length of peduncle 45 mm., breadth 9 mm. The largest individual described by Darwin has a capitulum measuring 25·4 mm. in length, and that by Hoek (1883) 33·6 mm. in length. Both are shorter than the Discovery specimen. The fully grown specimens agree well with those figured by Weltner (1922, Fig. 2). For comparison a figure of a full-grown specimen is given. It is of more interest to describe and figure the young stages, as they are not exactly figured for all *Lepas* species.

The *first stage* (Fig. 10, *a*) found is a pupa without any traces of plates. The initial differentiation of the peduncle and the body has already taken place. The prehensile antennae are very difficult to detach from the attachment surface. The shape of the distal segments cannot be seen until the next stage. They have been studied and figured previously.

The *second stage* (Fig. 10, *b*) shows the further development of the peduncle, which extends outside the Cypris valves. Under these the primordial valves of the capitulum are formed.

The *third stage* (Fig. 10, *c*) has a more developed peduncle, and is just leaving the pupa stage, as the Cypris valves have been cast off.

In the *fourth stage* (Fig. 10, *d*) the calcareous plates begin to appear under the primordial valves. The same is to be seen in the next two stages (Fig. 10, *e*, *f*). By development of these plates the primordial valves of the scuta are moved a little from the occludent margin, a feature also stated for *L. hillii* (Leach, 1818) (see Nilsson-Cantell, 1928, p. 15). In the carina the prongs begin to develop, but they are smaller in these young stages than in the fully grown individual. The umbonal teeth in the scuta are to be seen already in the young stages here figured. This does not agree with what Jennings (1915, p. 289) found in young specimens of the same species. He found only "an incurving at the umbo of either scutum". Possibly there is some variation in this character. Finally it must be noted that there exists an individual variation in the size. Young stages are sometimes found to be larger than more mature stages.

Genus **Conchoderma**, Olfers, 1814

Conchoderma auritum (Linné, 1767). (Plate I, figs. 1, 2, 3.)

For synonymy see Nilsson-Cantell, 1921, *Zool. Bidrag Uppsala*, VII, p. 240.

24. ii. 25. South Georgia. From Blue whale, ♀. 22·58 m. No. 46. Two small specimens on *Coronula reginae*.

27. xi. 25. South Shetland Islands. From Sperm whale, ♂. Many specimens from teeth.

20. i. 26. South Georgia. From Humpback whale, ♀. 13·55 m. No. 387. Many specimens on *Coronula diadema.*

6. ii. 26. South Shetland Islands. From Humpback whale (a very white specimen). Many specimens on *Coronula diadema.*

23. vii. 26. Durban. From Humpback whale. No. D 3. Many specimens on *Coronula diadema.*

5. ix. 26. Saldanha Bay. From Blue whale, ♀. 21·3 m. No. 1065. One large specimen on *Coronula reginae*, on mandible of whale.

15. xi. 26. South Georgia. From Blue whale, ♀. 25·1 m. No. 1196. Two fully grown specimens from baleen plate. (Plate I, figs. 1, 2.)

13. iv. 27. Deception Island. From Fin whale. One fully grown specimen on tail.

29. i. 27. South Shetland Islands. From Fin whale. Many specimens from baleen plates. (Plate I, fig. 3.)

29. vi. 27. Simon's Town. From ship's side. One specimen.

Distribution. Cosmopolitan and pelagic, on *Coronula* attached to whales, on teeth and baleen plates of whales. Also situated on such objects as fishes, eels, ships and buoys.

Supplementary Description. This species, which was collected from ten sources, is the best represented in the collection. To the previous descriptions, especially that of Darwin (1851), not much need be added. Some remarks regarding this material, however, may be made.

The largest specimen I have seen was among those collected on January 29, 1927, from a Fin whale in the South Shetlands. Its measurements were: length of capitulum 60 mm., breadth 33 mm.; length of peduncle 76 mm., breadth 15 mm. Darwin's largest individual measured 125 mm. in total length. Broch (1924) mentions a specimen with a capitulum of 35 mm. in length. Otherwise individuals of all sizes down to 6 mm. in total length are represented in the material.

As regards the colour, the same observation may here be made as that made by Cornwall (1927), namely, that specimens situated on black objects, as for instance on the dark tail of a whale, are almost black.

The five plates are well developed in small and medium sized specimens. We find five plates also in a large specimen having a length of capitulum of 47 mm., a breadth of 22 mm., a length of peduncle of 42 mm., and a breadth of 11 mm. This individual has a carina of only 1 mm. in length, a tergum 5 mm. in length, and a scutum 11 mm. in length. But great variation seems to exist, and one finds small specimens in which the terga and carina have disappeared. According to Broch (1924) the terga disappear before the carina, and in this material I have found the same feature. In many specimens, however, the carina is reduced before the terga. In large individuals the terga and carina are lost.

The peduncle is in many individuals widely expanded in the basal part, as in the large specimens from a Fin whale in the South Shetlands in January 1927. This widely expanded surface of attachment has already been mentioned by Darwin (1851, p. 144).

Six specimens were found together on the side of a baleen plate (Plate I, fig. 3). The surfaces of attachment of the individuals were cemented together to one plate. Other specimens, from a Blue whale in South Georgia, November 1926, have the basal part of the peduncle lobed.

Most of the material was attached to *Coronula diadema* (Linné, 1767) and *C. reginae*, Darwin, 1854, which seems to be the most common host for this cirripede. These species of *Coronula* were taken from the skin of Humpback and Blue whales. I have never seen the species fixed directly in the skin. Here we may add as new places of situation: baleen plates of Fin and Blue whales and the teeth of Sperm whales. The collector, A. G. Bennett, has written the following regarding the occurrence of this species on the teeth of a Sperm whale in the South Shetland Islands, November 1925: "This whale had the fore end of the jaw curved round to the right. On this curvature barnacles were growing around each tooth. Obviously, the jaw, being bent round the teeth at the anterior end, did not fit the groove in the upper jaw. Otherwise it would be impossible for parasites to establish themselves". In the literature *C. auritum* is mentioned from teeth of the Bottle-nosed whale (*Hyperoodon rostratus*). Finally it may be noted that *C. auritum* has been taken from other animals, e.g. slow moving fishes according to Dr A. Gould (Darwin, 1851), and the tail of a large eel (*Gymnothorax favagineus*) according to Barnard (1924). The species is also found on dead things. Darwin (1851) mentions ships' bottoms. One specimen in this material was taken from the ship's sides (Simon's Town, June 1927).

Conchoderma virgatum (Spengler, 1790). (Plate I, fig. 4.)

For synonymy see Nilsson-Cantell, 1921, *Zool. Bidrag Uppsala*, VII, p. 242.

8. xi. 25. 2° 02′ 09″ N, 12° 33′ 00″ S. Gear **NH**. Five specimens from ship's sides.

4. x. 26. Saldanha Bay. From Blue whale, ♂, 17·6 mm. No. 1170. Two fully grown specimens attached to *Pennella*. (Plate I, fig. 4.)

Distribution. Cosmopolitan and pelagic from telegraph-cables, ships, drift-wood, and many animals. The following were hitherto known: fishes, eels, sea-snakes, turtles, decapods and copepods parasitic on whales.

Supplementary Description. The specimens are all typical *C. virgatum*. The variations in the shape of the scuta have been discussed by Nilsson-Cantell (1928). Small individuals have narrower branches as in Fig. 7, *b* (Nilsson-Cantell, 1928), and large individuals are more like Fig. 7, *c* (Nilsson-Cantell, 1928).

The species is also of interest as regards the attachment. It is found attached to ships' bottoms, as were those taken in November 1925. Other floating objects like drift-wood provide a suitable attachment surface for this Cirripede. It is known from many animals as, for example, *Mola mola* (Broch, 1924), sea snakes, *Hydrus platurus* (Krüger, 1911), the eel, *Gymnothorax favagineus* (Barnard, 1924), the decapod, *Neptunus pelagicus*, and turtles (several authors). The Discovery material contains some specimens from the

parasitic copepod *Pennella* from a Blue whale. Hoek (1909) notes a similar occurrence of the species. It is certainly to be found on many other animals.

The individuals from the ship's sides, 8. xi. 25, 2° 02′ 09″ N, 12° 33′ 00″ W, were collected thirty-four days after the ship left England. Their measurements were: length of capitulum 19 mm., breadth 12·5 mm.; length of peduncle 22 mm., breadth 9 mm.

Genus **Hexelasma**, Hoek, 1913

Hexelasma corolliforme (Hoek, 1883).

Balanus corolliformis, Hoek, 1883, *Challeng. Rep.* VIII, p. 155; Gruvel, 1905, *Monogr. Cirrhip.* p. 255.

St. 175. 2. iii. 27. Bransfield Straits, South Shetlands. 63° 17′ 20″ S, 59° 48′ 15″ W. 200 m., m. st. g. Gear **DLH**. One specimen.

DISTRIBUTION. Kerguelen and South Shetland Islands. 200–280 m.

SUPPLEMENTARY DESCRIPTION. Of this genus *Hexelasma*, created by Hoek in 1913, eight species are known. The species here dealt with was first regarded by Hoek as a *Balanus*. The Discovery specimen is a little smaller than that figured by Hoek. The external shape of the type differs in the more developed plates in the wall, and in the consequent wider orifice. This is due only to a difference in age.[1]

The shell in this specimen is covered by a brown membrane with chitinous spines situated on the growth ridges, and this is in agreement with the description of Hoek. After removal of this membrane the compartments are seen to be white.

The parietes are here fully figured and described.

Carina little more than half the breadth of the scutum, with distinctly indicated alae.

Carino-lateral compartments rather narrow, with a distinct ala on the lateral side. No radius visible externally. On the inside of this part a longitudinal depression is formed where the plate overlaps the carina.

Lateral compartment about twice as wide as the carino-lateral, and with a distinct ala on the rostral side. No external radius is here differentiated, but the plate covers the ala of the carino-lateral plate.

"Rostrum" constituting the broadest plate in the wall, with internally marked longitudinal furrows, against which the alae of the lateralia abut. This plate is held by Pilsbry (1916) and Withers (1928) to be composed of a real rostrum and two rostro-laterals. As the genus in all respects is a typical *Chthamalid*, the real rostrum ought to have alae.

The compartments of the wall in these specimens seem to be nearly of the same length. The "rostrum" is here somewhat longer than the carina. In some other species of *Hexelasma* the carina is longer than the rostrum (*H. antarcticum*, Borradaile, 1916, and *H. americanum*, Pilsbry, 1916). In this species I am unable to find any traces of a sheath which, in other *Hexelasma* species that have been described, is distinctly indicated. Hoek's specimens, to judge by his figure, seem not to have such parts.

[1] Since writing the above I find that *H. hirsutum* (Hoek, 1883) must be regarded as a synonym of this species, of which it is a younger stage.

The opercular valves agree with the type-description. Figures are given here for comparison.

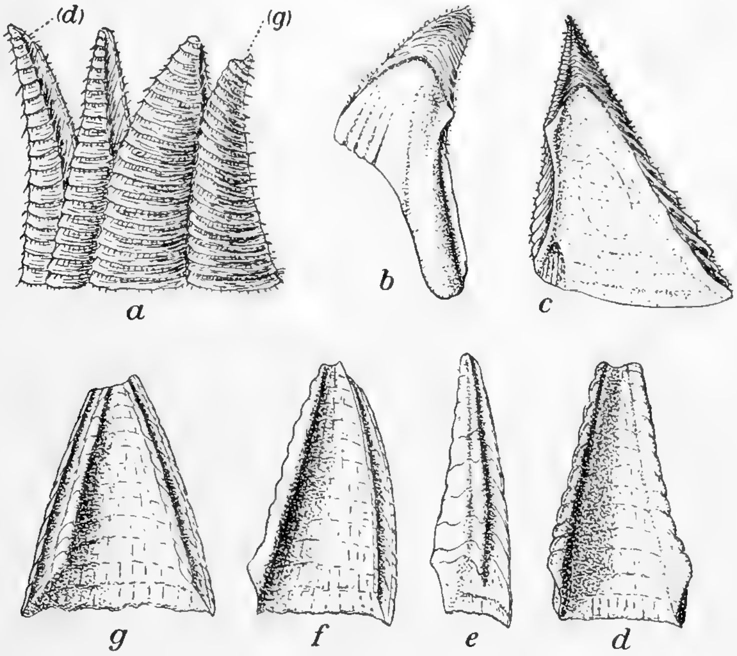

Fig. 11. *Hexelasma corolliforme*. *a*. Lateral view (carino-rostral diameter 10 mm.). *b*. Left tergum. *c*. Left scutum. *d*. Carina, internal view. *e*. Carino-lateral compartment, internal view. *f*. Lateral compartment, internal view. *g*. "Rostrum", internal view.

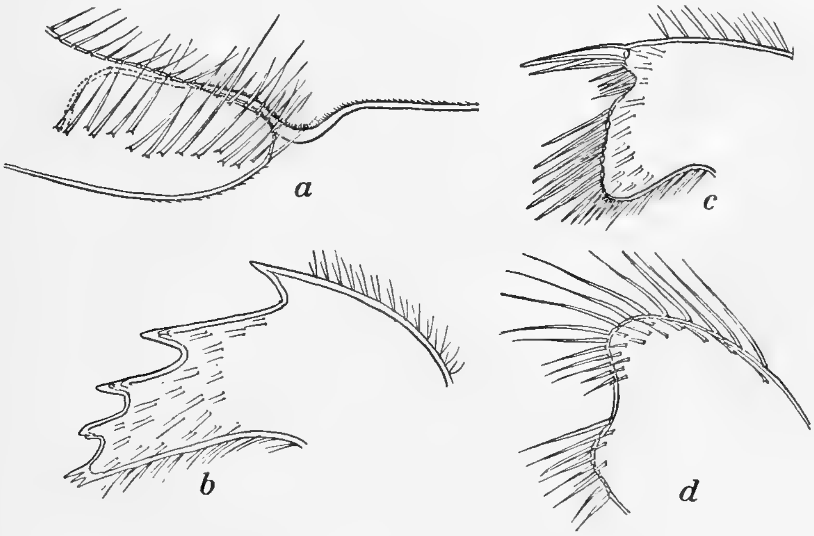

Fig. 12. *Hexelasma corolliforme*. *a*. Labrum and palpus. *b*. Mandible. *c*. Maxilla I. *d*. Maxilla II.

Scutum with a distinct articular ridge, an internal furrow in the upper part of the plate, a pit for the lateral depressor muscle, an indistinctly marked cavity for the adductor muscle, and an internal ridge, mentioned by Hoek, along the occludent margin.

Tergum with a strongly developed articular ridge, and a spur near the basi-scutal angle. Crests for depressor muscles indistinct.

Measurements: the carino-rostral diameter is 10 mm.; the height is 10 mm.

Mouth Parts: the mouth-parts are described by Hoek (1883) and partly figured. For comparison, figures of the Discovery specimen are given. Labrum of the *Chthamalid* type with a slight inward flexion in the middle. Free edge with hairs, but without teeth, a feature pointed out by Hoek. Palp long and rounded at the end, with feathered bristles. Mandible with four teeth (two to four with additional teeth) and an inferior angle divided into three small teeth (quite as stated by Hoek (1883)). Maxilla I with a broad notch in the upper part with smaller bristles. The lower part projects, and bears spines of about the same size. Maxilla II is bilobed as in *Chthamalus*.

Number of segments of the cirri

Cirrus	I		II		III		IV		V		VI	
Segments	9	12	13	15	18	20	24	26	28	30	30	31

The number of the segments are smaller than in Hoek's specimen, as this individual is younger. Cirrus I with unequal rami. Cirrus II with slightly unequal rami. Those following with nearly equal rami.

Genus **Balanus**, da Costa, 1778

Balanus maxillaris, Gronovius, 1763.

Gronovius, 1763, *Zool. Gronov. Iconogr.* v, Pl. xix, figs. 3, 4.
Lepas cylindrica, Gmelin, 1790, *Syst. Nat.* p. 3213.
Balanus capensis, Ellis, Darwin, 1854, *Monogr. Balanid.* p. 209; Gruvel, 1905, *Monogr. Cirrhip.* p. 218.
Balanus maxillaris, Pilsbry, 1916, *Bull. U.S. Nat. Mus.* No. 93, p. 77; Barnard, 1924, *Ann. S. Afric. Mus.* xx, No. 7, p. 67.

22.xii.25. Cape Town. From ship's sides. Two small specimens.

Distribution. South Africa (Cape of Good Hope, Cape Town, Algoa Bay).

Supplementary Description. Though the specimens are rather young (the largest has a carino-rostral diameter of 4 mm. and a height of 3 mm.), it was possible by studying the opercular plates to identify them as *B. maxillaris*. The internal parts of this species have not been closely studied. As the specimens are very small and not in a good state I will not give a description of the internal parts. They may best be studied in fully grown specimens.

Balanus laevis, Bruguiere, 1789.

For synonymy see Nilsson-Cantell, 1921, *Zool. Bidrag Uppsala*, vii, p. 321.

St. 52. 5.v.26. Port William, East Falkland Island. 17 m. Gear **LH**. Some small and large specimens on mussel shells.

St. 53. 12. v. 26. Port Stanley, East Falkland Island, on the hulk of the 'Great Britain'. 0–2 m. Gear **RM**. One medium sized specimen on a *Mytilus* shell.

St. 55. 16. v. 26. Port Stanley, East Falkland Island. 10–16 m. Gear **BTS**. Several young specimens on Mollusc shells.

St. 56. 16. v. 26. Sparrow Cove, Port William, East Falkland Island. $10\frac{1}{2}$–16 m. Gear **BTS**. Several young and old specimens on small shells of Molluscs with hermit crabs.

St. 57. 16. v. 26. Port William, East Falkland Island. 15 m. Gear **BTS**. Several large, mostly empty, shells.

St. 222. 23. iv. 27. St Martin's Cove, Hermite Island, Cape Horn. 30–35 m. Gear **NRL**. Three large specimens.

St. WS 95. 17. iv. 27. 48° 58′ 15″ S, 64° 45′ 00″ W. 109 m., f.d.s. st. sh. Gear **DC**. Several small dead shells on a mussel shell.

DISTRIBUTION. California, Chile, Peru, Tierra del Fuego, Magellan Strait, Falkland Islands, Sandwich Islands, Chinca Islands. From the tidal zone down to 275 m. (Nilsson-Cantell, 1921). The species is found on stones, shells, tubes, and according to Darwin also on *Balanus psittacus* (Molina, 1892), Darwin, 1854.

This well-known species is represented by several specimens. They are all quite typical. To the discussion by Nilsson-Cantell, 1921, nothing need be added here. It is of interest to note that some very small specimens were taken from St. 55. The smallest measures in carino-rostral diameter 1·5 mm.; all have six well developed compartments in the wall. Therefore it is not possible to make certain whether a stage with four valves exists here. The localities noted here are not new, as the species is well-known from the Falkland Islands and Cape Horn.

Genus **Elminius**, Leach, 1825

Elminius kingi, Gray, 1831.

For synonymy see Nilsson-Cantell, 1921, *Zool. Bidrag Uppsala*, VII, p. 348.

St. 53. 12. v. 26. Port Stanley, East Falkland Island, on the hulk of the 'Great Britain'. 0–2 m. Gear **RM**. One large and two smaller specimens on a *Mytilus* shell.

DISTRIBUTION. Tierra del Fuego, Patagonia, Chile. On rocks, shells and floating timber in tidal water.

SUPPLEMENTARY DESCRIPTION. This species has already been fully described by Darwin (1854) and Nilsson-Cantell (1921). The Discovery specimens are of a conical shape.

Shell white, without ribs, and in the larger individuals covered by a brown cuticle.

Opercular valves quite typical, and the internal parts are as described by Nilsson-Cantell (1921). The penis has a dorsal point at the base not previously mentioned for this genus. Darwin mentions this process for many species of *Balanus* (see also Nilsson-Cantell, 1921).

Measurements: the carino-rostral diameter of the large specimen is 14 mm., its height 11 mm. The carino-rostral diameter of one of the smaller specimens is 6 mm., its height 2 mm.

The number of segments of the cirri have been given by me (1921) for small individuals. It may here be completed for larger specimens.

Number of segments of the cirri

Cirrus		I		II		III		IV		V		VI	
Segments	Carino-rostral diameter 14 mm., height 11 mm.	8	14	10	11	13	14	24	25	—	28	—	32
	Carino-rostral diameter 4·5 mm. (Nilsson-Cantell, 1921)	8	14	10	10	11	12	18	24	25	26	—	25

The shorter cirri of both specimens agree fairly well in the number of segments. In the longer cirri an increase in number with age is to be noted. In the dissected specimen I observed that the segments of the posterior ramus of cirrus III had many coarsely pectinated spines at the upper border. This has been previously noted by Darwin in *E. plicatus*, Gray, 1843, who regarded it as of specific value. In *E. modestus*, Darwin, 1854, I did not find such spines, this being in agreement with Darwin.

Genus **Coronula**, Lamarck, 1802

Coronula diadema (Linné, 1767).

For synonymy see Nilsson-Cantell, 1921, *Zool. Bidrag Uppsala*, VII, p. 371.

20. i. 26. South Georgia. From a Humpback whale, ♀. 13·55 m. No. 387. One large specimen.

6. ii. 26. South Shetland Islands. From a very white Humpback whale. Two large and three small specimens.

23. vii. 26. Durban. From a Humpback whale, ♂. 11·5 m. No. D 3. Two large specimens.

Distribution. Probably cosmopolitan. The species is not yet known to occur universally in the oceans. No finds are known from the equatorial parts of the Atlantic and the Indian Oceans.

Supplementary Description. This species is represented by fully grown individuals. The young stages would be of interest to study, but none have been collected or described. The fully grown specimens are well-known, and have been described by Darwin (1854), Nilsson-Cantell (1921), Broch (1924), and Cornwall (1927). The specimens were taken from Humpback whales, which by most authors are mentioned as hosts. Probably the species is to be found on other whales (Barnard, 1924, p. 94).

The largest specimen has a carino-rostral diameter of 53 mm., and a height of 42 mm.

Coronula reginae, Darwin, 1854. (Plate I, figs. 5–10.)

For synonymy see Nilsson-Cantell, 1926, *Ark. Zool.* Bd. XVIII *a*, No. 27, p. 15.

24. ii. 25. South Georgia. From a Blue whale, ♀. 22·58 m. No. 46. One specimen with some young *Conchoderma auritum*.

24. vii. 26. Durban. From a Humpback whale, ♂. 9·55 m. No. D 4. Three specimens. (Plate I, figs. 9, 10.)

19. viii. 26. Saldanha Bay, South Africa. From a Blue whale, ♀. 25·05 m. No. 968. One young specimen.

20. viii. 26. Saldanha Bay, South Africa. From a Fin whale, ♂. 14·1 m. No. 973. One specimen on tail.

24. viii. 26. Saldanha Bay, South Africa. From a Fin whale, ♂. 15·5 m. No. 1000. Two smaller specimens embedded in the skin. (Plate I, fig. 8.)

5. ix. 26. Saldanha Bay, South Africa. From a Blue whale, ♂. 13·35 m. No. 1064. One small specimen from the flank, embedded in the skin. (Plate I, fig. 6.)

5. ix. 26. Saldanha Bay, South Africa. From a Blue whale, ♀. 21·3 m. No. 1065. One large specimen embedded in the skin.

7. ix. 26. Saldanha Bay, South Africa. From a Blue whale, ♀. 25·47 m. No. 1071. Two small specimens from the tip of the flipper. (Plate I, fig. 5.)

25. i. 27. South Georgia. From a Blue whale, ♀. 25·7 m. No. 1425. One specimen and marks of a large one from tail flukes.

One specimen from the skin of a whale (no number) from Saldanha Bay. (Plate I, fig. 7.)

DISTRIBUTION. This species is probably cosmopolitan. Hitherto it has been taken from the Arctic and Antarctic seas, the Northern and Southern Atlantic and Pacific Oceans. As the species is attached to whales it has been found in many localities, chiefly where there are whale fisheries.

SUPPLEMENTARY DESCRIPTION. The species is in my opinion rather uncertain. This question has been closely discussed by me (1926). I stated about this species, p. 15: "Es liegt nahe anzunehmen, dass die weniger stark abgeplatteten *C. reginae*, *C. diadema* sind, die nur eine andere Wachstumsweise angenommen haben. Sie sollten folglich verschiedene Variationen derselben Art darstellen. Es ist gegenwärtig nicht möglich dieses zu entscheiden, wie man auch die Ursache dieser Erscheinung auffassen mag." This rather rich material has not sufficed to clear up the question altogether. Some of the fully grown specimens are typically *C. reginae* (those from Saldanha Bay, 24. viii. 26, Plate I, fig. 8), others more intermediate between *C. diadema* and *C. reginae* (that from Saldanha Bay, 5. ix. 26). I thus prefer as before to recognize the species *C. reginae*. Many young examples of *Coronula* are represented in the Discovery material. I think they must all be considered as young *C. reginae*. One of them (from Saldanha Bay, 7. ix. 26) is very young, the youngest seen I think; it has a carino-rostral diameter of only 2 mm. (Plate I, fig. 5). Of the rest many sizes are represented.

For both the species, *C. diadema* and *C. reginae*, it is given as a typical character that the orifice of the body chamber is much larger than the basal opening. In *C. complanata* (Mörch) the basal opening is as large as the orifice. This character must apply rather to fully grown specimens. One young specimen (Plate I, fig. 7) shows both openings of the same diameter, but during further growth the comparative size of the openings is altered.

Cornwall (1928), who has studied young specimens of both species at a whaling station, says that *C. reginae* at first grows under the skin, which also is the case with young specimens of the Discovery material. Of *C. diadema* he says, p. 11: "They are not imbedded in the skin of the whale at any stage of their growth".

Terga, said by Pilsbry (1916) to be wanting, by Cornwall (1927) to be present in the small individuals. In this material they are found in small and rather large specimens.

I dissected some specimens of *C. diadema* and *C. reginae* and did not find the differences given by Broch (1924) between the mouth-parts, especially the mandibles. I refer here to Nilsson-Cantell, p. 16, 1926. Cornwall (1927) gives some differences in the number of spines in the longer cirri, for he found in *C. diadema* up to five pairs of spines, and in two dissected *C. reginae* three pairs in a smaller specimen and three longer pairs and one small pair in a larger specimen. As in *Balanus* we often find some differences in this character, which depends on age, and I think it has no great importance. Yet I will not for the present deny the possibility that two different but nearly related species exist.

The present specimens were taken from Blue whales, Fin whales, and Humpbacks, hosts previously recorded.

Genus **Xenobalanus**, Steenstrup, 1851

Xenobalanus globicipitis, Steenstrup, 1851.

For synonymy see Nilsson-Cantell, 1921, *Zool. Bidrag Uppsala*, VII, p. 375.

27. x. 25. 14° 45′ 00″ N, 18° 34′ 00″ W. Four fully grown specimens and one small specimen on the tip of flipper of a whale (species not given).

16. viii. 26. Saldanha Bay, South Africa. From Sei whale, ♀. 10·45 m. No. 952. One fully grown specimen.

20. viii. 26. Saldanha Bay, South Africa. From a Fin whale, ♂. 14·1 m. No. 973. Many specimens on tail, fluke, etc.

21. ix. 26. Saldanha Bay, South Africa. From a Blue whale, ♀. 16·82 m. No. 1104. One small specimen on the tip of flipper.

4. x. 26. Saldanha Bay, South Africa. From a Blue whale, ♂. 17·1 m. No. 1169. Seven fully grown specimens from the flukes.

13. iv. 27. Deception Island, South Shetlands. From a Fin whale. Several basal plates on the tail.

DISTRIBUTION. Probably cosmopolitan, on the skin of porpoises, dolphins and whales.

SUPPLEMENTARY DESCRIPTION. The species is here represented by several specimens from six different stations. Its morphology is already well known and seems not to vary much. Yet these finds are of great biological and zoogeographical interest. Before Calman (1920) this species was only noted from the North Atlantic Ocean. This author describes specimens from the Antarctic (South Shetland Islands). Later, Barnard (1924) describes specimens from other southern localities (Natal and Saldanha Bay, South Africa). Stebbing's species, *X. natalensis*, 1923, from the same catch, is held by Barnard to be typical *X. globicipitis*. As Cornwall (1927) describes some specimens from the Northern Pacific (Vancouver Islands, B.C.) the species, like other whale parasites, might have a very wide distribution: it might be said to be cosmopolitan. All the material here collected is from Antarctic waters, which shows that the species is rather common there, perhaps as much so as in northern seas.

The species was first found in the skin of porpoises (Darwin, 1854). By later authors it is mentioned from whales and dolphins. In the literature I find the following hosts for *Xenobalanus*:

Globicephala melaena (acc. to Nilsson-Cantell, 1921).
G. intermedius (acc. to Pilsbry, 1916).
Balaenoptera borealis (acc. to Nilsson-Cantell, 1921; Broch, 1924).
B. physalus (acc. to Barnard, 1924).
Tursiops catalania (acc. to Barnard, 1924).
Delphinus delphis (acc. to Gruvel, 1920).
Orcinus orca (acc. to Gruvel, 1920).
Pseudorca crassidens (acc. to Gruvel, 1920).
Grampus griseus (acc. to Gruvel, 1920).

The Discovery material contains specimens from the following Cetaceans:

Balaenoptera musculus.
B. physalus.
B. borealis.

The specimens were situated on different parts of the host, for it is here noted from the tail, tip of flipper, and the flukes. The largest specimen in the collection measures in total length 36 mm.

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PLATE I

Fig. 1. *Conchoderma auritum* (Linné, 1767). On baleen plate of Blue whale. About 1·7/1.

Fig. 2. *Conchoderma auritum* (Linné, 1767). On baleen plate of Blue whale. About 1·65/1.

Fig. 3. *Conchoderma auritum* (Linné, 1767). On baleen plate of Fin whale. About 0·73/1.

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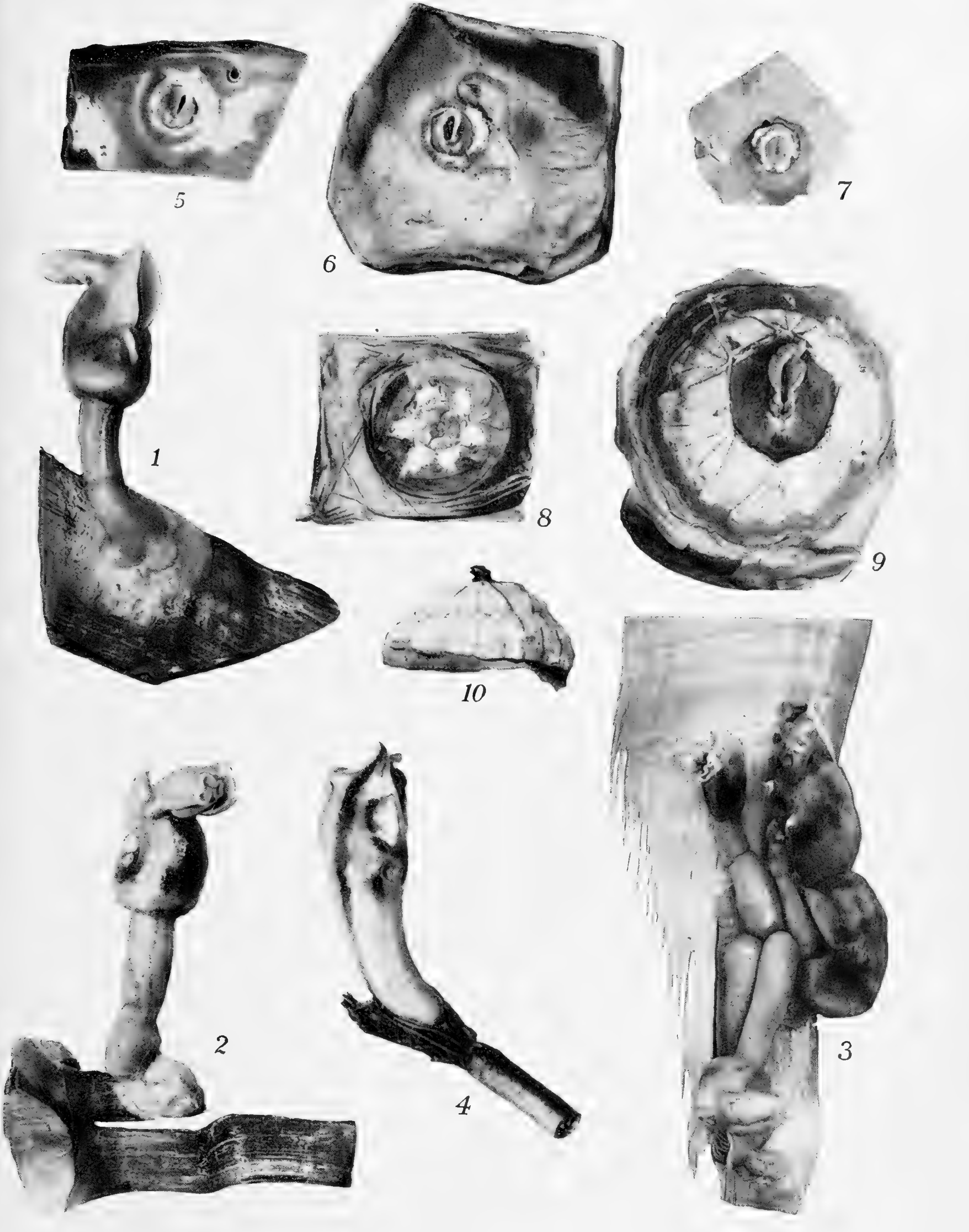
Fig. 8. *Coronula reginae*, Darwin, 1854. In the skin of a Fin whale. About 1·74/1.

Fig. 9. *Coronula reginae*, Darwin, 1854. One full-grown specimen in the skin of a Humpback whale. About 1·50/1.

Fig. 10. *Coronula reginae*, Darwin, 1854. The same specimen from the carinal side. About 1·40/1.



THORACIC CIRRIPEDES

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DISCOVERY REPORTS

Vol. II, pp. 261–370, plate II, text-figs. 1–47

Issued by the Discovery Committee, Colonial Office, London
on behalf of the Government of the Dependencies of the Falkland Islands

OCEANIC FISHES AND FLATFISHES COLLECTED IN 1925–1927

by

J. R. Norman

CAMBRIDGE
AT THE UNIVERSITY PRESS
1930

Price eleven shillings net

Cambridge University Press
Fetter Lane, London

New York
Bombay, Calcutta, Madras
Toronto
Macmillan

Tokyo
Maruzen Company, Ltd

[*Discovery Reports. Vol. II, pp.* 261–370, *Plate II*, text-figs. 1–47, November, 1930.]

OCEANIC FISHES AND FLATFISHES COLLECTED IN 1925–1927

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CONTENTS

OCEANIC FISHES AND FLATFISHES COLLECTED IN 1925–1927

By J. R. Norman
Assistant Keeper, Department of Zoology, British Museum (Natural History)[1]

(Plate II, text-figs. 1–47).

PART I. OCEANIC FISHES

INTRODUCTION

The present report is based on the collections of oceanic fishes made by the R.R.S. 'Discovery' and, to a much less extent, by the R.R.S. 'William Scoresby' from 1925 to 1927, chiefly in the South Atlantic and Antarctic Oceans, at depths ranging from the surface down to 3500 metres. No larval or postlarval specimens are included, as this material will be the subject of a separate investigation. The report is entirely systematic in nature, as it is the author's intention to defer any theoretical considerations until a later date, when it is confidently expected that further material will be available. The collections already studied, however, have proved of great interest, and since the work of the Danish vessel, the 'Dana', and of several American investigators has been confined chiefly to the northern parts of the ocean, the material brought back by the 'Discovery' should add considerably to our knowledge of the fish fauna of the Atlantic.

As will be seen from the list which follows, the number of species obtained is about 160, represented in all by more than 2000 specimens: of these 18 prove to be new to science, 3 representing new genera. The identification of the members of the family Gonostomatidae has proved a matter of some difficulty, and a revision of these fishes has been included in this report, based not only on the Discovery material but on all the specimens in the British Museum, including those obtained by the 'Challenger'. Revisions of the fishes of the Berycoid genus *Melamphaës*, and of the family Chiasmodontidae, also based on the Discovery collections, have already been published in the *Annals and Magazine of Natural History* for last year.

When a considerable amount of material of some well-known species has been obtained from a number of different stations in the South Atlantic, no attempt has been made to give a complete list of these records of locality, etc., in the usual manner, but a general summary of the localities is given. All the text-figures accompanying this report are the work of Lieut.-Col. W. P. C. Tenison, D.S.O.

The author takes this opportunity of offering his thanks to the members of the Discovery Committee for placing this valuable material at his disposal and for entrusting him with the preparation of this report. Thanks are also due and are heartily

[1] Submitted for publication by permission of the Trustees of the British Museum.

tendered to Dr S. L. Hora of the Indian Museum, Professor L. Roule of the Paris Museum, Mr A. E. Parr of the Bingham Oceanographic Collection, and Mr A. V. Tåning of the Carlsberg Laboratory, Copenhagen, for the loan of type specimens, or for information concerning certain fishes under their charge.

LIST OF STATIONS

When a large number of specimens of a well-known species has been obtained from various stations no attempt has been made to give the data in full, and a mere summary is given in the report. A list of these particular stations, with the necessary data, and names of the species obtained, follows.

St. 3. 3. xii. 25. 29° 31′ 06″ S, 13° 56′ 45″ W. 2 m. tow-net, horizontal, 500–700 m.: 6 *Argyropelecus hemigymnus*, 10–32 mm.

St. 9. 11. ii. 26. 46° 11′ 30″ S, 22° 27′ 30″ W. 4½ m. net, horizontal, 3500 (–0) m.: 5 *Cyclothone microdon*, 43–56 mm.

St. 65. 22. v. 26. 48° 18′ 00″ S, 53° 09′ 00″ W. 2 m. tow-net, horizontal, 120 (–0) m.: 2 *Lampanyctus* sp., 48–65 mm.

St. 66. 23. v. 26. 48° 09′ 00″ S, 52° 50′ 00″ W. 1 m. tow-net, horizontal, 90 (–0) m.: 1 *Lampanyctus guentheri*, 28 mm.; 1 *L. alatus*, 39 mm.

St. 69. 25. v. 26. 45° 06′ 00″ S, 49° 00′ 00″ W. 70 cm. tow-net, horizontal, 90 (–0) m.: 1 *Lampanyctus guentheri*, 41 mm.

St. 71. 30. v. 26. 43° 20′ 00″ S, 46° 02′ 00″ W. 70 cm. tow-net, vertical, 500–750 m.: 1 *Cyclothone microdon*, 27 mm.

St. 72. 1. vi. 26. 41° 43′ 20″ S, 42° 20′ 40″ W. 4½ m. net, horizontal, 2000 (–0) m.: 5 *Cyclothone microdon*, 45–65 mm.

St. 76. 5. vi. 26. 39° 50′ 30″ S, 36° 23′ 00″ W. 4½ m. net, horizontal, 1500 (–0) m.: 28 *Cyclothone microdon*, 30–56 mm.; 1 *Lampanyctus alatus*, 43 mm.; 1 *L. guentheri*, 36 mm.

St. 78. 12. vi. 26. 35° 18′ 00″ S, 19° 01′ 10″ W. Young-fish trawl, 1000 (–0) m.: 72 *Cyclothone microdon*, 15–55 mm.; 1 *Sternoptyx diaphana*, 10 mm.; 1 *Lampanyctus* sp., 25 mm.

St. 79. 13. vi. 26. 34° 48′ 00″ S, 16° 36′ 00″ W. 4½ m. net, horizontal, 1000 (–0) m.: 5 *Cyclothone microdon*, 28–52 mm.

St. 80. 17. vi. 26. 32° 46′ 00″ S, 10° 00′ 00″ W. 2 m. tow-net, horizontal, 30 (–0) m.: 2 *Lampanyctus townsendi*, 40–67 mm.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. 4½ m. net, horizontal, 650 (–0) m.: 70 *Cyclothone microdon*, 15–40 mm.; 6 *Argyropelecus hemigymnus*, 18–34 mm.; 12 *Sternoptyx diaphana*, 17–25 mm.; 8 *Lampanyctus* sp., 15–32 mm.

St. 83. 21. vi. 26. 32° 30′ 50″ S, 1° 23′ 30″ W. 2 m. tow-net, horizontal, 650 (–0) m.: 9 *Argyropelecus hemigymnus*, 9–26 mm.; 4 *Lampanyctus* sp., 35–62 mm.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. 4½ m. net, horizontal, 2000 (–0) m.: 67 *Cyclothone microdon*, 20–60 mm.; 2 *Argyropelecus hemigymnus*, 23–29 mm.; 1 *Sternoptyx diaphana*, 12 mm.; 1 *Lampanyctus townsendi*, 22 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 14 *Cyclothone microdon*, 24–45 mm.; 4 *Argyropelecus hemigymnus*, 9–21 mm.; 3 *Sternoptyx diaphana*, 14–22 mm.; 1 *Myctophum laternatum*, 23 mm.; 1 *Lampanyctus* sp., 88 mm.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 19 *Cyclothone microdon*, 17–50 mm.; 18 *Argyropelecus hemigymnus*, 8–24 mm.; 5 *Sternoptyx diaphana*, 12–16 mm.

St. 89. 28. vi. 26. 34° 05′ 15″ S, 16° 00′ 45″ E. Young-fish trawl, 1000 (–0) m.: 25 *Cyclothone microdon*, 12–50 mm.; 4 *Argyropelecus hemigymnus*, 15–27 mm.; 3 *Myctophum laternatum*, 11–24 mm.

St. 100. 4. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. Young-fish trawl, 2000–2500 m.: 23 *Cyclothone microdon*, 30–60 mm.; 4 *Argyropelecus hemigymnus*, 14–32 mm.; 4 *Myctophum laternatum*, 19–27 mm. Young-fish trawl, 625–675 m.: 1 *Argyropelecus hemigymnus*, 32 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net, horizontal, 850–950 m.: 7 *Sternoptyx diaphana*, 13–25 mm.; 6 *Lampanyctus alatus*, 40–92 mm. 1310–1410 m.: 1 *Lampanyctus* sp., 100 mm.

St. 104. 31. x. 26. 41° 33′ 30″ S, 17° 58′ 00″ W. 70 cm. tow-net, vertical, 110 m.: 1 *Lampanyctus townsendi*, 50 mm.

St. 151. 16. i. 27. 53° 25′ 00″ S, 35° 15′ 00″ W. 4½ m. net, horizontal, 1025–1275 m.: 22 *Cyclothone microdon*, 34–68 mm.; 1 *Lampanyctus* sp., 76 mm.

St. 169. 22. ii. 27. 60° 48′ 50″ S, 51° 00′ 20″ W. Young-fish trawl, 1000–1100 m.: 3 *Cyclothone microdon*, 55–60 mm.

St. 239. 2. vi. 27. 46° 56′ 00″ S, 46° 03′ 00″ W. 4½ m. net, horizontal, 1050–1350 (–0) m.: 89 *Cyclothone microdon*, 28–60 mm.; 7 *Lampanyctus alatus*, 80–102 mm.

St. 240. 2. vi. 27. 46° 36′ 30″ S, 45° 07′ 00″ W. 70 cm. tow-net, horizontal, 40 (–0) m.: 1 *Lampanyctus guentheri*, 38 mm. 1 m. tow-net, horizontal, 70 (–0) m.: 1 *L. guentheri*, 43 mm. 35 m.: 1 *L. guentheri*, 43 mm.

St. 241. 5. vi. 27. 40° 34′ 30″ S, 36° 35′ 30″ W. 1 m. tow-net, horizontal, 152 m.: 3 *Lampanyctus guentheri*, 41–50 mm. 70 cm. tow-net, horizontal, 49 (–0) m.: 2 *L. guentheri*, 30–46 mm.

St. 242. 7. vi. 27. 39° 16′ 30″ S, 30° 26′ 00″ W. 70 cm. tow-net, horizontal, 124 m.: 1 *Lampanyctus guentheri*, 45 mm. 62 m.: 2 *L. guentheri*, 32–44 mm.

St. 245. 10. vi. 27. 38° 20′ 00″ S, 22° 18′ 00″ W. 4½ m. net, horizontal, 1800–2000 m.: 9 *Cyclothone microdon*, 26–54 mm.

St. 256. 23. vi. 27. 35° 14′ 00″ S, 6° 49′ 00″ E. Young-fish trawl, 850–1100 (–0) m.: 70 *Cyclothone microdon*, 14–54 mm.; 2 *Sternoptyx diaphana*, 30–60 mm.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. Young-fish trawl, 250 (–0) m.: 1 *Argyropelecus hemigymnus*, 32 mm.; 3 *Lampanyctus alatus*, 69–73 mm.

St. 258. 25. vi. 27. 35° 03′ 30″ S, 13° 55′ 00″ E. Young-fish trawl, 320–450 m.: 1 *Argyropelecus hemigymnus*, 30 mm.

St. 267. 23. vii. 27. 24° 31′ 00″ S, 12° 15′ 30″ E. Young-fish trawl, 450–550 (–0) m.: 1 *Argyropelecus hemigymnus*, 22 mm.

St. 268. 25. vii. 27. 18° 37′ 00″ S, 10° 46′ 00″ E. Young-fish trawl, 100–150 (–0) m.: 1 *Lampanyctus guentheri*, 43 mm.

St. 269. 26. vii. 27. 15° 55′ 00″ S, 10° 35′ 00″ E. 4½ m. net, horizontal, 600–700 (–0) m.: 4 *Sternoptyx diaphana*, 15–43 mm.; 14 *Stomias colubrinus*, 90–265 mm.; 9 *Lampanyctus* sp., 70–103 mm.

St. 270. 27. vii. 27. 13° 58′ 30″ S, 11° 43′ 30″ E. Young-fish trawl, 200 (–0) m.: 2 *Stomias colubrinus*, 63–118 mm. 70 cm. tow-net, oblique, 126 (–0) m.: 1 *S. colubrinus*, 68 mm. 1 m. tow-net, oblique, 125 (–0) m.: 1 *S. colubrinus*, 55 mm.; 1 *Lampanyctus townsendi*, 60 mm.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. 1 m. tow-net, oblique, 110 (–0) m.: 3 *Stomias colubrinus*, 130–150 mm.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850–950 (–0) m.: 12 *Sternoptyx diaphana*, 6–25 mm.; 1 *Lampanyctus guentheri*, 81 mm.

St. 282. 12. viii. 27. 1° 11′ 00″ S, 5° 38′ 00″ E. Young-fish trawl, 300 (–0) m.: 1 *Stomias colubrinus*, 90 mm.

St. 284. 15. viii. 27. 2° 13′ 00″ S, 1° 52′ 00″ E. 1 m. tow-net, oblique, 71 (–0) m.: 3 *Lampanyctus guentheri*, 40–69 mm.; 4 *L. alatus*, 19–42 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. 4½ m. net, horizontal, 125–175 (–0) m.: 2 *Sternoptyx diaphana*, 21–22 mm.; 2 *Myctophum laternatum*, 14–20 mm.; 1 *Lampanyctus townsendi*, 66 mm.; 10 *L. alatus*, 18–48 mm.

St. 286. 17. viii. 27. 3° 06′ 30″ S, 3° 53′ 00″ W. Young-fish trawl, 125 (–0) m.: 1 *Lampanyctus townsendi*, 48 mm.; 4 *L. guentheri*, 23–62 mm. 70 cm. tow-net, oblique, 102 (–0) m.: 4 *L. guentheri*, 42–61 mm. 1 m. tow-net, oblique, 102 (–0) m.: 4 *L. alatus*, 26–55 mm.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 11 *Sternoptyx diaphana*, 6–23 mm.; 1 *Lampanyctus townsendi*, 32 mm. 4½ m. net, horizontal, 800–1000 (–0) m.: 1 *Myctophum laternatum*, 19 mm.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 1 *Sternoptyx diaphana*, 8 mm.; 4 *Lampanyctus guentheri*, 34–54 mm.; 5 *L. alatus*, 20–37 mm. 1 m. tow-net, oblique, 73 (–0) m.: 1 *Myctophum laternatum*, 16 mm.; 1 *Lampanyctus townsendi*, 55 mm.; 1 *L. guentheri*, 52 mm. 70 cm. tow-net, oblique, 100 (–0) m.: 1 *L. guentheri*, 46 mm.; 2 *L. alatus*, 21–41 mm.

St. 289. 23. viii. 27. 3° 04′ 45″ N, 16° 52′ 00″ W. Young-fish trawl, 125–225 (–0) m.: 1 *Myctophum laternatum*, 21 mm.; 3 *Lampanyctus alatus*, 23–45 mm. 1 m. tow-net, oblique, 132 (–0) m.: 2 *L. guentheri*, 21–32 mm.

St. 293. 24. viii. 27. 4° 18′ 15″ N, 16° 51′ 00″ W. 1 m. tow-net, oblique, 100–120 (–0) m.: 2 *Lampanyctus guentheri*, 32–60 mm.

St. 294. 25. viii. 27. 4° 33′ 15″ N, 16° 52′ 45″ W. Young-fish trawl, 100–150 (–0) m.: 2 *Lampanyctus townsendi*, 20–27 mm.; 1 *L. alatus*, 43 mm.

St. 295. 25. viii. 27. 5° 30′ 30″ N, 17° 45′ 00″ W. Young-fish trawl, 2500–2700 (–0) m.: 2 *Sternoptyx diaphana*, 16–21 mm.

St. 296. 26. viii. 27. 8° 12′ 00″ N, 18° 49′ 00″ W. 1 m. tow-net, oblique, 120 (–0) m.: 1 *Stomias colubrinus*, 112 mm.; 1 *Lampanyctus guentheri*, 23 mm.; 3 *L. alatus*, 23–45 mm. 70 cm. tow-net, oblique, 120 (–0) m.: 2 *Myctophum laternatum*, 20–21 mm.; 1 *Lampanyctus townsendi*, 20 mm.; 3 *L. alatus*, 21–39 mm.

St. 297. 28. viii. 27. 12° 08′ 00″ N, 20° 53′ 30″ W. 70 cm. tow-net, oblique, 163 (–0) m.: 1 *Stomias colubrinus*, 110 mm.; 1 *Lampanyctus alatus*, 40 mm. 1 m. tow-net, oblique, 163 m.: 1 *L. townsendi*, 17 mm.; 3 *L. alatus*, 30–34 mm. Young-fish trawl, 200–300 (–0) m.: 1 *L. guentheri*, 37 mm.

16. x. 25. 29° 27′ N, 15° 07′ W. 2 m. tow-net, horizontal, 900 (–0) m.: 5 *Sternoptyx diaphana*, 9–17 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 4 *Sternoptyx diaphana*, 15–39 mm.; 8 *Stomias colubrinus*, 60–170 mm.; 1 *Lampanyctus alatus*, 42 mm.; 3 *Lampanyctus* sp., 58–115 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 12 *Sternoptyx diaphana*, 15–24 mm.

SYSTEMATIC ACCOUNT

Order ISOSPONDYLI

Family ALEPOCEPHALIDAE

The fifteen genera of this family may be conveniently grouped as follows:

I. Origin of pelvic fins at or about the middle of the length (without caudal); eyes normal; pectoral fins comparatively short.
  A. Snout short or of moderate length.
    1. Body with scales.
      a. Pelvic fins present.
        * Maxillaries toothless. — *Alepocephalus* (incl. *Conocara*), *Asquamiceps*, *Ericara*, *Leptochilichthys*, *Xenognathus*
        ** Maxillaries with teeth. — *Bajacalifornia*, *Bathytroctes* (incl. *Talismania*), *Narcetes*
      b. Pelvic fins absent. — *Platytroctes*
    2. Scales absent, sometimes replaced by small nodules.
      a. Maxillary not extending beyond eye; no fold in front of dorsal fin.
        * Dorsal and anal fins sub-equal, well separated from caudal, which is well developed; eyes of moderate size. — *Xenodermichthys*, *Rouleina*
        ** Dorsal fin much shorter than anal, which is more than half the length of fish; caudal peduncle and caudal fin very small; eyes very large. — *Leptoderma*
      b. Maxillary extending well beyond eye; a high median fold in front of the dorsal fin. — *Anomalopterus*
  B. Snout long, tube-like, with a small mouth at its extremity; scales minute, scarcely imbricated. — *Aulastomatomorpha*

II. Origin of pelvic fins well behind the middle of the length; eyes telescopic; pectoral fins very long. — *Dolichopteryx*

Aleposomus, Gill, is a synonym of *Xenodermichthys*; *Mitchillina*, Jordan and Evermann, and *Benthosphyraena*, Cockerell, appear to be identical with *Alepocephalus*.

Asquamiceps velaris, Zugmayer.

Zugmayer, 1911, *Bull. Inst. Océan. Monaco*, 193, p. 2; 1911, *Rés. Camp. Sci. Monaco*, XXXV, p. 10, pl. i, fig. 4.

St. 101. 14–15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 2580 m.: 1 specimen, 90 mm.[1]

Depth of body 5 in the length, length of head $2\frac{1}{5}$. Diameter of eye a little less than length of snout, which is $4\frac{1}{3}$ in that of head; interorbital width $8\frac{1}{2}$. Maxillary nearly reaching middle of eye; no teeth in upper jaw; lower jaw with microscopical teeth. Gill-membranes united as far back as a point well behind the eye; apparently 5 branchiostegal rays; membranous expansion of operculum partly covering the pectoral fin. Scales cycloid, irregularly arranged and partially embedded in the skin; about 65 scales

[1] All the specimens included in this report are measured to the base of the caudal fin.

in a longitudinal series. Dorsal 15; anal 15; both fins originating at about the same level. Pectoral with 13 or 14 rays, broad-based, rounded, shorter than eye. Uniformly blackish; fins pale.

Described from a single specimen, 90 mm. in length.

Hab. North and South Atlantic.

This genus seems to be well distinguished from *Alepocephalus* by the form of the gill-membranes, the smaller number of branchiostegal rays, the nature of the dentition, and the broad-based, rounded pectoral fin.

Bathytroctes (Bathytroctes) rostratus, Günther, 1878. [Pl. II, fig. 3.]

Bathytroctes rostratus, Holt and Byrne, 1908, *Fisheries, Ireland, Sci. Invest.* 1906, v, p. 45, pl. iv, figs. 3–5.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 2 specimens, 30–47 mm.

St. 101. 14–15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net, horizontal, 350–450 (–0) m.: 2 specimens, 30–40 mm.

I have identified these young examples with *Bathytroctes rostratus*, Günther, after some hesitation, as it is difficult to compare them accurately with the type, which is considerably larger. They agree very closely, however, with the small specimens described by Holt and Byrne under this name. All exhibit the pigmented "supraclavicular process", and there is no sign of this diminishing in size in the largest of the specimens collected by the 'Discovery'. I count 19 to 20 rays in the dorsal fin, and 14 to 16 in the anal. No mention is made by Holt and Byrne of the small oval luminous organs, which in the preserved specimens appear as white spots. They are regularly arranged, and seem to disappear altogether in the adult fish. A coloured sketch of the ventral surface of one of the specimens from St. 86, made by Mr E. R. Gunther (Pl. II, fig. 3), shows the luminous organs red in colour in the fresh fish, although some of those which had been damaged appeared white. Their arrangement has been well described by Brauer ('*Valdivia*' *Tiefsee-Fische*, p. 17, pl. xiv, figs. 2–3), and is shown in the accompanying figures. Between the pelvic fins is a deeply pigmented globular body, with a luminous spot on its anterior and posterior surfaces.

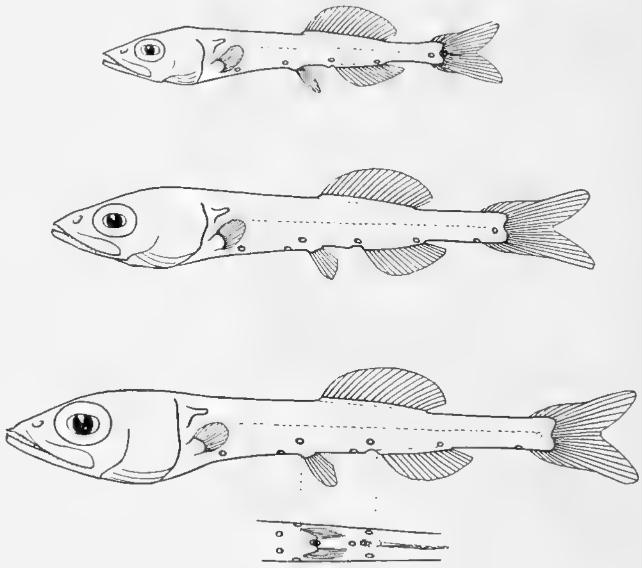

Fig. 1. Outline drawings of three young specimens of *Bathytroctes* (*Bathytroctes*) *rostratus*, respectively 30, 40 and 47 mm. in length. (× 1½.) A portion of the ventral surface of the largest specimen is included to illustrate the arrangement of some of the principal luminous organs.

Bathytroctes (Bathytroctes) sp.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. 4½ m. net, 2000 (–0) m.: 1 specimen, 56 mm.

This young specimen agrees very closely with those described above, but the anal fin originates below the anterior part of the dorsal. The "supraclavicular process" is present, but the luminous organs are much less developed.

Bathytroctes (Talismania) homopterus, Vaillant.

Bathytroctes homopterus, Vaillant, 1888, *Expéd. Sci. 'Travailleur' et 'Talisman', Poissons*, p. 153, pl. xii, fig. 1.

Bathytroctes (*Talismania*) *homopterus*, Goode and Bean, 1895, *Ocean. Ichth.* p. 43.

St. 269. 26. vii. 27. 15° 55′ 00″ S, 10° 35′ 00″ E. 4½ m. net, horizontal, 600–700 (–0) m.: 2 specimens, 83–100 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 1 specimen, 47 mm.

Depth of body 4¼ in the length, length of head a little more than 3. Snout a little shorter than eye, diameter of which is about 3⅛ in length of head and equal to interorbital width. Upper part of operculum with a series of diverging ridges ending in feeble

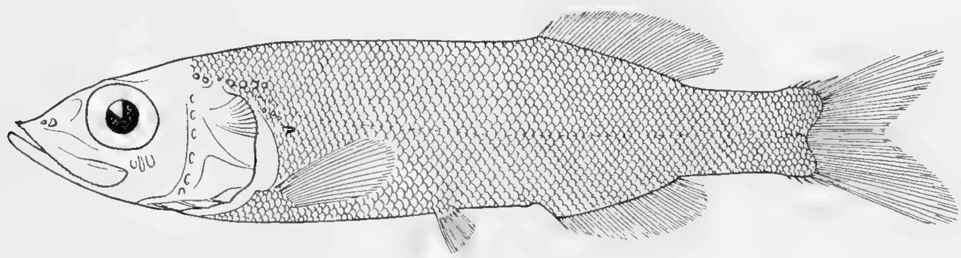

Fig. 2. *Bathytroctes* (*Talismania*) *homopterus*. (× 1.)

pointed projections. A pointed membranous process above the clavicle. Praemaxillary somewhat protruding, bearing two or three forwardly directed teeth anteriorly, of which the inner are longest, followed by a series of smaller conical teeth; the anterior teeth are more prominent in the young; maxillary toothed, extending to below middle of eye or a little beyond. About 20 gill-rakers on lower part of anterior arch. 67–75 scales in a longitudinal series. Dorsal 18–20; origin a little nearer posterior edge of operculum than base of caudal. Anal 16–18; origin slightly behind that of dorsal. Caudal peduncle 1¾ times as long as deep.

Described from three specimens, 47 to 100 mm. in length.

Hab. North Atlantic.

Professor L. Roule has kindly compared one of these specimens with the type of the species preserved in the Paris Museum, and writes as follows: "Quant à la spécification, elle penche plutôt, à mon avis, après examen, du côté *B. homoptera* Vaillant. Pourtant, l'exemplaire étant unique, et de petite taille, il m'est malaisé d'opiner avec sûreté". It is of interest to note that the "supraclavicular process" is still present in the largest example.

In his monograph of the marine fishes of South Africa (1925, *Ann. S. Afric. Mus.* XXI, p. 122), Barnard mentions a specimen of *Bathytroctes* in the British Museum collection from Cape Point, registered as *B. homopterus*, Vaillant, and presumably collected by the S.S. 'Pieter Faure'. I have examined this fish, which is not a *Bathytroctes* but an *Alepocephalus*. It appears to belong to a species new to science, and may, therefore, be described here.

Alepocephalus barnardi, n.sp.

Bathytroctes rostratus (*non* Günther), Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 122.

Depth of body 6 in the length, length of head 3. Snout about as long as eye, diameter of which is $3\frac{1}{2}$ in length of head; interorbital width $5\frac{2}{3}$. Maxillary extending nearly to below middle of eye; lower jaw included. About 16 gill-rakers on lower part of anterior arch. 50 (?) scales in a longitudinal series. Dorsal 18. Anal 18; origin below fifth dorsal ray, more than twice as distant from end of snout as from base of caudal. Caudal peduncle nearly 3 times as long as deep.

Described from a single specimen, 200 mm. in length.

Hab. Off Cape Point, South Africa; 700 fms.

This species appears to be close to *A. blanfordi*, Alcock, the type of which has been lent to me for examination by the Indian Museum. It differs in having a more slender body, rather longer snout, wider interorbital region, and more slender caudal peduncle. It may be distinguished from *A. productus*, Goode and Bean, by the narrower body, longer snout and larger orbit, and longer caudal peduncle; and from *A. umbriceps*, Jordan and Thompson, by the longer snout and larger eye.

Xenodermichthys socialis, Vaillant.

Vaillant, 1888, *Expéd. Sci. 'Travailleur' et 'Talisman', Poissons*, p. 162, pl. xiii, fig. 1; Collett, 1896, *Rés. Camp. Sci. Monaco*, X, p. 138; Koehler, 1896, *Ann. Univ. Lyon*, III, p. 520, pl. xxvii, fig. 11; Holt and Byrne, 1908, *Fisheries, Ireland, Sci. Invest.* 1906, V, p. 48, pl. V, fig. 2; Roule, 1915, *Bull. Mus. Paris*, No. 2, p. 42; 1919, *Rés. Camp. Sci. Monaco*, LII, p. 10, pl. i, fig. 5; Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 123.

Aleposomus socialis, Goode and Bean, 1895, *Ocean. Ichth.* p. 48, fig. 58.

Aleposomus cyaneus, Zugmayer, 1914, *Bull. Inst. Océan. Monaco*, 288, p. 1.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. Young-fish trawl, 150 (–0) m.: 1 specimen, 100 mm.

X. copei, Gill, from the Western Atlantic, is perhaps identical with this species, but appears to have a somewhat larger head and a larger eye. *X. nodulosus*, Günther, from Japan, is easily distinguished by the longer and slenderer body, shorter head, smaller eye, and by the gill-opening only extending to a little above the base of the pectoral.

Rouleina (*Aleposomus*, Roule *nec* Gill) is close to *Xenodermichthys*, but differs in the large mouth with stronger teeth, which are developed on the maxillary as well as on the

praemaxillary and mandible, and in the smaller number of dorsal and anal rays—14 to 21 instead of 27 to 30. There are five species, viz: *R. guentheri* (Alcock, 1892), *R. squamilaterus* (Alcock, 1898), *R. lividus* (Brauer, 1906), *R. nudus* (Brauer, 1906), and *R. watasii* (Tanaka, 1909).

Dolichopteryx longipes (Vaillant).

Aulostoma (?) *longipes*, Vaillant, 1888, *Expéd. Sci. 'Travailleur' et 'Talisman', Poissons*, p. 340, pl. xxvii, fig. 4.

Dolichopteryx anascopa, Brauer, 1902, *Sitz. Ges. Beford. Ges. Naturwiss. Marburg*, 1901, No. 8, p. 127; 1906, '*Valdivia*' *Tiefsee-Fische*, p. 24, fig. 4.

St. 101. 14–15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net, horizontal, 350–400 (–0) m.: 1 specimen, 120 mm.

St. 295. 25. viii. 27. 5° 30′ 30″ N, 17° 45′ 00″ W. Young-fish trawl, 2500–2700 m.: 1 specimen, 100 mm.

Hab. North and South Atlantic.

Vaillant's specimen, taken off the coast of Morocco at a depth of 1163 m., was poorly preserved and only 45 mm. in total length. It agrees very closely with that described by Brauer, but there are said to be only 5 dorsal, 9 anal, and 6 pelvic rays, and the

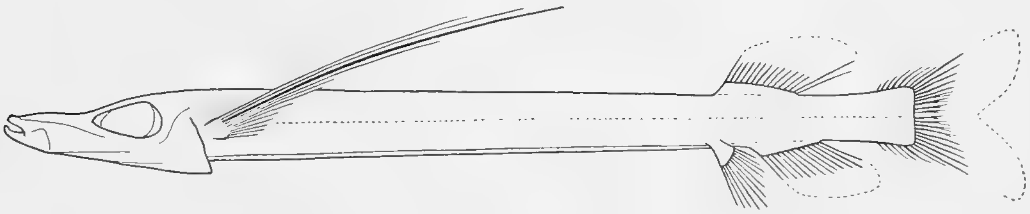

Fig. 3. *Dolichopteryx longipes*. (× 1.)

pectoral fin is shown in the figure as being comparatively short; further, the eye is not depicted as telescopic. Brauer's example, also somewhat damaged, was nearly 35 mm. in length, and was taken in the Indian Ocean (west of the Cocos Islands) at a depth of 2400 m. The two specimens obtained by the 'Discovery' are almost certainly the adults of the same species, but are both very poorly preserved. They differ from the smaller specimens in having a more slender body, smaller head, and the pelvic fins inserted much further back. If, as I believe, all the specimens represent a single species, there is a marked migration of the pelvic fins during growth. In Brauer's example (35 mm.) their origin is about 1¾ times as distant from end of snout as from base of caudal; in Vaillant's specimen (45 mm.) it is about twice as far; in the smaller of the 'Discovery' examples (100 mm.) it is 2⅖, and in the larger (120 mm.) 3½. A brief description of these two specimens follows.

Depth of body about 12 in the length, length of head about 4½. Minute teeth are present, at least in the upper jaw. Pseudobranchiae developed. Dorsal 15 (?); last ray above middle of anal. Anal 12. Pectoral 14; elongate, the third ray broader than the

remainder. Pelvic 12; origin $2\frac{2}{5}$ to $3\frac{1}{2}$ times as distant from end of snout as from base of caudal. Pectoral and pelvic fins with a muscular basal lobe.

In one of the above-mentioned specimens I have been able to see enough of the skull to convince me that Brauer was correct in placing this genus in the family Alepocephalidae. The structure of the jaws—the maxillary, two supplemental bones, etc.—appears to be similar to that found in *Aulastomatomorpha*, Alcock, as described by Henning (1906, *Ann. Mag. Nat. Hist.*, (7), XVIII, p. 307, fig.).

Family ARGENTINIDAE

Revision of the Genus **Bathylagus**

I have been able to dissect a poorly preserved example of this genus, but as it has been in formalin the skeletal characters are difficult to make out. I cannot be certain whether there is a mesocoracoid, but the parapophyses seem to be ventral rather than lateral. Regan (1913, *Trans. R. Soc. Edinburgh*, XLIX (ii), pp. 231, 289) has placed this genus in the family Argentinidae as defined by him, and I am convinced that it belongs here rather than to the Microstomidae, with which it is generally associated.

Bathymacrops, Gilchrist, 1922, is easily distinguished by the position of the dorsal fin, which is in advance of the pelvics, and by the small anal fin. *Microstoma oblitum*, Facciola, 1887, from the Mediterranean, may prove to belong to this family. The anal fin has seven to nine rays, and the origin of the pelvics is immediately behind the dorsal. The body is rather compressed, but in other characters, and especially in the dentition, it bears a close resemblance to *Microstoma*.

Synopsis of the Species of Bathylagus

I. Origin of dorsal nearer to base of caudal than to end of snout.

  A. Dorsal with 12 rays; anal with 13 rays; occipital region normal. 1. *argyrogaster*, n.sp.

  B. Dorsal with 8 rays; anal with at least 24 rays; occipital region swollen, with a median keel. 2. *milleri*, Jordan and Evermann, 1898

II. Origin of dorsal nearer to end of snout than to base of caudal.

  A. Anal with 13 rays; depth of body $4\frac{1}{4}$ in length. 3. *atlanticus*, Günther, 1878

  B. Anal with 16 to 25 rays; depth of body 5 to $7\frac{1}{3}$ in length.

    1. Diameter of eye $2\frac{3}{5}$ in head, which is $5\frac{1}{4}$ to $5\frac{1}{3}$ in length of fish. 4. *microcephalus*, n.sp.

    2. Diameter of eye 2 to $2\frac{1}{2}$ (rarely $2\frac{3}{5}$) in head, which is 4 to $4\frac{2}{3}$ in length of fish.

      a. Origin of anal $2\frac{2}{3}$ to $3\frac{1}{5}$ times as distant from end of snout as from base of caudal; base of fin $4\frac{1}{2}$ to nearly 6 in length of fish.

        * Depth of body 6 to $7\frac{1}{3}$ in length; anal with 18 to 21 rays.

          † Depth of body 6 to $6\frac{1}{4}$ in length, length of head $4\frac{1}{8}$ to $4\frac{1}{3}$; interocular width $2\frac{3}{4}$ to 3 in head; origin of dorsal nearer to adipose fin than to end of snout. 5. *glacialis*, Regan, 1913

          †† Depth of body 7 to $7\frac{1}{3}$ in length, length of head $4\frac{1}{4}$ to $4\frac{3}{5}$; interocular width 4 or more in head; origin of dorsal equidistant from end of snout and adipose fin. 6. *gracilis*, Lönnberg, 1905

** Depth of body 5 to $5\frac{3}{5}$ in length; anal usually with 19 to 25 rays.

† Head $4\frac{1}{3}$ to $4\frac{3}{5}$ in length of fish; eye $2\frac{1}{5}$ to $2\frac{1}{2}$ in head, equal to or less than postorbital part of head; anal with 22 to 25 rays, length of base $4\frac{1}{2}$ to $5\frac{1}{5}$ in that of fish. 7. *antarcticus*, Günther, 1878

†† Head $4\frac{1}{5}$ to $4\frac{1}{3}$ in length of fish; eye a little more than 2 in head, greater than postorbital part of head; anal with about 19 rays, length of base $5\frac{3}{5}$ to $5\frac{2}{3}$ in that of fish. 8. *benedicti*, Goode and Bean, 1895

††† Head 4 to $4\frac{1}{12}$ in length of head; eye $2\frac{1}{4}$ to $2\frac{1}{2}$ in head; anal with (16) 19 rays. 9. *pacificus*, Gilbert, 1890

b. Origin of anal $3\frac{1}{3}$ to $3\frac{3}{5}$ times as distant from end of snout as from base of caudal; base of fin $6\frac{1}{4}$ to $6\frac{2}{3}$ in length of fish. 10. *euryops*, Goode and Bean, 1895

Bathylagus argyrogaster, n.sp.

St. 268. 25. vii. 27. 18° 37′ 00″ S, 10° 46′ 00″ E. 1 m. tow-net, oblique, 73 (–0) m.: 1 specimen, 62 mm. Young-fish trawl, 100–150 (–0) m.: 3 specimens, 40–81 mm.

St. 269. 26. vii. 27. 15° 55′ 00″ S, 10° 35′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 600–700 (–0) m.: 2 specimens, 68–99 mm.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. Young-fish trawl, 150 (–0) m.: 1 specimen, 34 mm.

St. 284. 15. viii. 27. 2° 13′ 00″ S, 1° 52′ 00″ E. 1 m. tow-net, oblique, 71 (–0) m.: 1 specimen, 75 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. $4\frac{1}{2}$ m. net, horizontal, 125–175 (–0) m.: 5 specimens, 23–115 mm.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 1 specimen, 30 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. $4\frac{1}{2}$ m. net, horizontal, 900 (–0) m.: 1 specimen, 46 mm.

Depth of body $4\frac{2}{3}$ to $5\frac{1}{2}$ in the length, length of head $3\frac{4}{5}$ to $4\frac{1}{5}$. Diameter of eye $2\frac{1}{2}$ to $2\frac{3}{4}$ in length of head, interocular width about 3, interorbital width about 5. Dorsal

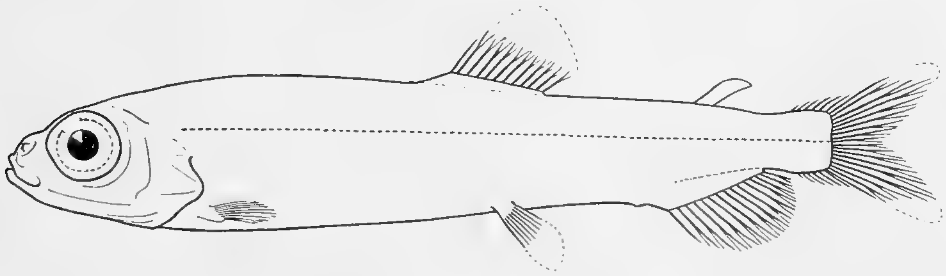

Fig. 4. *Bathylagus argyrogaster*. Holotype. (× 1.)

12; origin equidistant from base of caudal and anterior part or middle of eye. Anal 14–15 (? 16); origin about equidistant from base of caudal and insertion of pelvic or nearer the latter, $3\frac{1}{4}$ to 4 times as distant from end of snout as from base of caudal; length of base 7 to nearly 8 times in that of fish. Pelvics 8-rayed, inserted below middle of dorsal. About 39 scales in a longitudinal series. Brownish above, silvery below; operculum silvery black.

Described from several specimens, up to 115 mm. in length. The largest example from St. 285 is selected as the holotype.

Hab. North and South Atlantic.

This species differs from all the others in its lighter coloration, and was actually taken in shallower water than any of the remaining specimens of *Bathylagus* collected by the 'Discovery'. It may be distinguished from all except *B. milleri* by the more posterior insertion of the dorsal fin.

Bathylagus milleri, Jordan and Evermann.

Jordan and Evermann, 1898, *Bull. U.S. Nat. Mus.* XLVII (3), p. 2825.

Hab. Cortez Banks, off San Diego, California; 776 fathoms.

Known only from the much mutilated type, 155 mm. in length.

Bathylagus atlanticus, Günther.

Günther, 1878, *Ann. Mag. Nat. Hist.* (5), II, p. 248; 1887, *Deep-sea Fish. 'Challenger'*, p. 219.
? *Bathylagus atlanticus*, Holt and Byrne, 1906, *Fisheries, Ireland, Sci. Invest.* 1905, II, p. 6, pl. i, figs. 3–4.

Depth of body $4\frac{1}{4}$ in the length, length of head a little more than 4. Diameter of eye $2\frac{1}{8}$ in length of head, interocular width $3\frac{1}{5}$, interorbital width $5\frac{1}{3}$. Dorsal 9; origin nearer to end of snout than base of caudal. Anal 13; origin nearer to base of caudal than insertion of pelvic, $3\frac{3}{5}$ times as distant from end of snout as from base of caudal; length of base $7\frac{2}{3}$ in that of fish. Pelvics 8-rayed, inserted below last ray of dorsal. About 36 scales in a longitudinal series.

Described from a single specimen, 160 mm. in length, type of the species.

Hab. Atlantic.

The specimens described by Holt and Byrne, the largest of which is 54 mm. in length, were taken off the coast of County Mayo, Western Ireland. I have been unable to re-examine these examples, but, through the courtesy of Mr G. P. Farran of the Department of Fisheries, Dublin, I have had the opportunity of studying several more small specimens taken off south-west Ireland subsequent to the publication of Holt and Byrne's paper. Nearly all these are too young to be identified with any degree of certainty, but one, which is 50 mm. in length, may be the young of this species or of *B. benedicti*. A brief description of this fish follows:

Depth of body $5\frac{1}{2}$ in the length, length of head nearly 4. Diameter of eye about twice in length of head, interocular width 3. Dorsal 10. Anal 16 (or 17); origin about equidistant from base of caudal and insertion of pelvic, $3\frac{1}{5}$ times as distant from end of snout as from base of caudal; length of base 6 in that of fish.

One specimen, 50 mm., 50° 57′ N, 11° 38′ W. Mesoplankton trawl at about 700 fathoms.

Bathylagus microcephalus, n.sp.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 1 specimen, 129 mm. $4\frac{1}{2}$ m. net, horizontal, 350–400 m.: 1 specimen, 172 mm. Holotype.

St. 239. 2. vi. 27. 46° 56′ 00″ S, 46° 03′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1050–1350 m.: 4 specimens, 38–84 mm.?

Depth of body 6 to $6\frac{1}{5}$ in the length, length of head $5\frac{1}{4}$ to $5\frac{1}{3}$. Diameter of eye $2\frac{3}{5}$ in length of head, interocular width nearly 3, interorbital width $5\frac{1}{4}$. Dorsal 10–11; origin much nearer to end of snout than base of caudal, equidistant from former and adipose fin. Anal 20–22; origin about equidistant from base of caudal and insertion of pelvic, $2\frac{5}{6}$ to $3\frac{1}{5}$ times as distant from end of snout as from base of caudal; length of base 5 to $5\frac{2}{3}$ in that of fish. Pelvics 10-rayed, inserted below middle or posterior part of dorsal. About 42 scales in a longitudinal series.

Described from two specimens, 129 and 172 mm. in length, of which the larger is selected as the holotype.

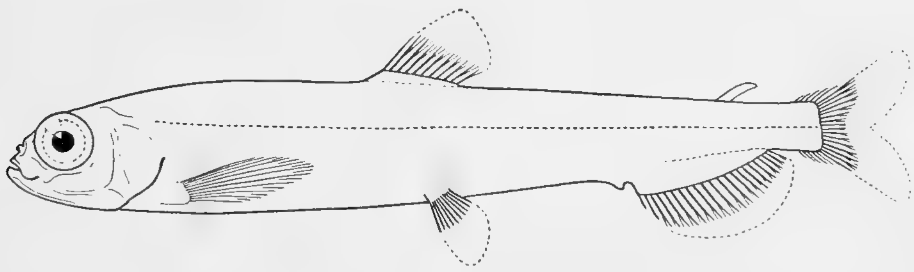

Fig. 5. *Bathylagus microcephalus*. Holotype. (× $\frac{5}{8}$.)

Hab. South Atlantic.

This species is close to *B. antarcticus*, differing chiefly in the somewhat slenderer body, shorter head, smaller eye and rather longer snout, and the more anterior position of the dorsal fin.

Bathylagus glacialis, Regan.

Bathylagus antarcticus (part), Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 13, fig. 2.
Bathylagus glacialis (part), Regan, 1913, *Trans. R. Soc. Edinb.* XLIX (ii), p. 231, pl. ix, fig. 2.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 3 specimens, 24–34 mm.

St. 104. 31. x. 26. 41° 33′ 30″ S, 17° 58′ 00″ W. 1 m. tow-net, horizontal, 112 m.: 1 specimen, 45 mm.

St. 239. 2. vi. 27. 46° 56′ 00″ S, 46° 03′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1050–1350 (–0) m.: 2 specimens, 102–118 mm.

Depth of body 6 to $6\frac{1}{4}$ in the length, length of head $4\frac{1}{8}$ to $4\frac{1}{3}$. Diameter of eye $2\frac{1}{6}$ to $2\frac{1}{4}$ in length of head, interocular width $2\frac{3}{4}$ to 3, interorbital width about 6. Dorsal 10; origin nearer to end of snout than base of caudal, but nearer to adipose fin than end of snout. Anal 18–21; origin equidistant from base of caudal and insertion of pelvic or a little nearer the latter, $2\frac{3}{4}$ to $3\frac{1}{5}$ times as distant from end of snout as from base of caudal; length of base nearly 6 times in that of fish. Pelvics 8- or 9-rayed, inserted below middle of dorsal. 36 to 40 scales in a longitudinal series.

Described from four specimens, 80 to 135 mm. in length, including the types of the species.[1]

[1] Of the five type-specimens of *B. glacialis* two are preserved in the British Museum collection, of which one proves to belong to *B. euryops*. The remainder are in the Royal Scottish Museum at Edinburgh: through the kindness of Dr J. Ritchie I have been able to examine these examples, and find them all identical with the type of *glacialis* in this museum.

Hab. North and South Atlantic; Antarctic.

In addition to the material collected by the 'Discovery' and that in the British Museum, I have examined another specimen, 135 mm. in length, from off Tearaght Rock, Co. Kerry, S.W. Ireland, at a depth of 720 to 695 fathoms, kindly lent to me by the National Museum of Ireland, Dublin.

Apart from its more slender form, somewhat larger head and shorter anal fin, this species is very close to *B. antarcticus*.

Bathylagus gracilis, Lönnberg.

Lönnberg, 1905, *Wiss. Ergebn. Schwed. Südpolar-Exped.* v (6), p. 68.

St. 72. 1. vi. 26. 41° 43′ 20″ S, 42° 20′ 40″ W. $4\frac{1}{2}$ m. net, horizontal, 2000 (–0) m.: 1 specimen, 65 mm.?

St. 76. 5. vi. 26. 39° 50′ 30″ S, 36° 23′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1500 (–0) m.: 2 specimens, 50–76 mm.

St. 151. 16. i. 27. 53° 25′ 00″ S, 35° 15′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1025–1275 m.: 5 specimens, 30–85 mm.

St. WS 303. 6. x. 28. 54° 51′ 24″ S, 31° 20′ 12″ W. 70 cm. tow-net, vertical, 1000–750 m.: 1 specimen, 50 mm.[1]

St. WS 307. 7. x. 28. 54° 19′ 30″ S, 30° 31′ 30″ W. 70 cm. tow-net, vertical, 1000–780 m.: 1 specimen, 60 mm.[1]

Closely related to *B. glacialis*, but depth of body 7 to $7\frac{1}{3}$ in the length, length of head $4\frac{1}{4}$ to $4\frac{3}{5}$. Diameter of eye about twice in length of head, interocular width about 4, interorbital width $6\frac{1}{2}$ to $7\frac{1}{2}$. Interorbital space deeply concave. Dorsal 10; origin equidistant from end of snout and adipose fin. Anal 19–20; origin $2\frac{2}{3}$ to 3 times as distant from end of snout as from base of caudal; length of base about 5 times in that of fish. 40 to 44 scales in a longitudinal series.

Described from four specimens, 50 to 85 mm. in length.

Hab. South Atlantic; Antarctic.

Bathylagus antarcticus, Günther.

Günther, 1878, *Ann. Mag. Nat. Hist.* (5), II, p. 248; 1887, *Deep-Sea Fish. 'Challenger'*, p. 220; Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 129.
? *Bathylagus antarcticus* (part), Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 12.

St. 71. 30. v. 26. 43° 20′ 00″ S, 46° 02′ 00″ W. Young-fish trawl, 2000 (–0) m.: 1 specimen, 142 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 1 specimen, 200 mm. $4\frac{1}{2}$ m. net, horizontal, 350–400 m.: 3 specimens, 35–65 mm.

St. 151. 16. i. 27. 53° 25′ 00″ S, 35° 15′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1025–1275 m.: 2 specimens, 105–128 mm.

[1] A note on the label states that the specimens obtained by the 'William Scoresby' were alive and healthy when brought to the surface in the net, and that one of them lived for just under 12 hours after capture.

Depth of body $5\frac{1}{4}$ to $5\frac{3}{5}$ in the length, length of head $4\frac{1}{3}$ to $4\frac{3}{5}$. Diameter of eye $2\frac{1}{5}$ to $2\frac{1}{2}$ in length of head, equal to or less than postorbital part of head; interocular width 3 to $3\frac{1}{2}$, interorbital width $6\frac{2}{3}$ to 7. Dorsal 9–11; origin nearer to end of snout than base of caudal. Anal (21) 22–25; origin nearer insertion of pelvic than base of caudal, $2\frac{2}{3}$ to $3\frac{1}{6}$ times as distant from end of snout as from base of caudal; length of base $4\frac{1}{2}$ to $5\frac{1}{5}$ in that of fish. Pelvics 9- or 10-rayed, inserted below middle or posterior part of dorsal. 39–44 scales in a longitudinal series.

Described from eight specimens, 35 to 200 mm. in length, including the type of the species (105 mm.).

Bathylagus benedicti, Goode and Bean.

Goode and Bean, 1895, *Ocean. Ichth.* p. 55, fig. 64; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 529.

? *Bathylagus elongatus*, Roule, 1916, *Bull. Inst. Océan. Monaco*, 320, p. 8; 1919, *Rés. Camp. Sci. Monaco*, LII, p. 22, pl. i, fig. 2.

St. 72. 1. vi. 26. 41° 43′ 20″ S, 42° 20′ 40″ W. $4\frac{1}{2}$ m. net, horizontal, 2000 (–0) m.: 3 specimens, 120–135 mm.

St. 151. 16. i. 27. 53° 25′ 00″ S, 35° 15′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1025–1275 m.: 1 specimen, 115 mm.

Very close to the preceding species. Depth 5 to $5\frac{3}{5}$ in the length, length of head $4\frac{1}{5}$ to $4\frac{1}{3}$. Diameter of eye a little more than 2 in head, greater than postorbital part of head; interocular width $2\frac{2}{3}$ to nearly 3, interorbital width $5\frac{2}{3}$ to 6. Dorsal 9 or 10. Anal about 19; origin 3 to $3\frac{1}{5}$ times as distant from end of snout as from base of caudal; length of base $5\frac{3}{5}$ to $5\frac{2}{3}$ in that of fish.

Described from four specimens, 115 to 135 mm. in length.

Hab. North and South Atlantic.

Bathylagus pacificus, Gilbert.

Gilbert, 1890, *Proc. U.S. Nat. Mus.* XIII, p. 55; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 530; Gilbert, 1915, *Proc. U.S. Nat. Mus.* XLVIII, p. 312.

Bathylagus borealis, Gilbert, 1896, *Rep. U.S. Fish. Comm.* (1893), p. 402; Jordan and Evermann, 1898, *Bull. U.S. Nat. Mus.* XLVII (3), p. 2824.

Hab. Pacific coast of North America from the Bering Sea to southern California.

Bathylagus euryops, Goode and Bean.

Goode and Bean, 1895, *Ocean Ichth.* p. 55, fig. 63; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 529.

Bathylagus euryops latifrons, Lönnberg, 1905, *Wiss. Ergebn. Schwed. Südpolar-Exped.* V (6), p. 67.

? *Bathylagus atlanticus*, Holt and Byrne, 1906, *Fisheries, Ireland, Sci. Invest.* 1905, II, p. 6, pl. i, figs. 3–4.

? *Bathylagus euryops*, Holt and Byrne, 1913, *ibid.* 1912, I, p. 24, fig. 10.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 1 specimen, 185 mm. $4\frac{1}{2}$ m. net, horizontal, 1410–1310 m.: 1 specimen, 152 mm.

St. 169. 22. ii. 27. 60° 48′ 50″ S, 51° 00′ 20″ W. Young-fish trawl, 1000–1100 m.: 1 specimen, 69 mm.?

St. 245. 10. vi. 27. 38° 20′ 00″ S, 22° 18′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1800–2000 m.: 1 specimen, 127 mm.

Depth of body $5\frac{1}{3}$ to $6\frac{1}{2}$ in the length, length of head $4\frac{1}{4}$ to $4\frac{2}{3}$. Diameter of eye $2\frac{1}{3}$ to $2\frac{3}{5}$ in length of head, interocular width $3\frac{1}{5}$ to $3\frac{1}{3}$, interorbital width about 6. Dorsal 9–10; origin a little nearer to end of snout than base of caudal. Anal 16–18; origin nearer base of caudal than insertion of pelvic, $3\frac{1}{3}$ to $3\frac{3}{5}$ times as distant from end of snout as from base of caudal; length of base $6\frac{1}{4}$ to $6\frac{2}{3}$ in that of fish. Pelvics 8- or 9-rayed, inserted below middle or posterior part of dorsal. 37 to 41 scales in a longitudinal series.

Described from five specimens, 69 to 185 mm. in length. In addition to the Discovery material I have examined one other specimen, 152 mm. in length, from 51° 35′ N, 11° 55′ W, at a depth of 720 fathoms, lent to me by the National Museum of Ireland.

Hab. North and South Atlantic.

Family GONOSTOMATIDAE

MONOGRAPH OF THE FAMILY

The Gonostomatidae represent the most primitive family of the sub-order Stomiatoidea, which is distinguished from the Clupeoidea by the presence of photophores. According to Regan,[1] *Photichthys*, the most primitive genus, is very similar to *Elops* in skeletal characters. The family may be defined as follows:—

Elongate fishes, with or without scales; mouth moderate or rather large; suspensorium generally directed more or less obliquely backwards. No special postocular luminous organ, and no barbel. Gill-arches with gill-rakers. Dorsal fin in advance of or above anterior part of anal, generally followed by an adipose fin; pectorals low, pelvics nearly in the middle of the length. Skull elongate, with the parasphenoid nearly straight; parietals well developed, meeting or approaching each other above supraoccipital; epiotics separated by supraoccipital; basisphenoid and alisphenoids present; no orbitosphenoid. Praemaxillary without anterior expansion; maxillary with two supplemental bones. Post-temporal forked; mesocoracoid present.

Fourteen genera, all of which are oceanic in habitat.

Synopsis of the Genera

I. Serial photophores on body arranged in continuous longitudinal rows; pseudobranchiae absent or very feebly developed. (Gonostomatinae)
   A. A single series of photophores on each side of abdomen; origin of dorsal fin nearly opposite to that of anal.
      1. Origin of dorsal fin a little behind that of anal; no adipose fin; dorsal with 20 rays, anal with 29 rays. 1. *Bonapartia*
      2. Origin of dorsal fin a little in front of that of anal; adipose fin present; dorsal with 16 rays, anal with 23–26 rays. 2. *Margrethia*

[1] 1923, *Ann. Mag. Nat. Hist.* (9), XI, p. 613.

B. Two series of photophores on each side of abdomen.

1. Interorbital region rather wide; eyes normal; mouth large; teeth well developed; origin of dorsal behind pelvics.

a. No additional serial photophores on sides of body.

* Origin of dorsal fin opposite to or behind that of anal.

† Praemaxillary and maxillary with a continuous series of long acute teeth, set at fairly regular intervals, with much smaller teeth in the interspaces between them; second suborbital more or less enlarged; eye of moderate size; anal with 22 to 31 rays. 3. *Gonostoma*

†† Praemaxillary with few teeth; maxillary with a series of small teeth, increasing in size from before backwards, some of them at more or less irregular intervals a little enlarged; second suborbital not enlarged; eye small; anal with 16 to 20 rays. 4. *Cyclothone*

* Origin of dorsal fin in advance of that of anal.

† Origin of dorsal fin a little in advance of that of anal, which commences below its middle or posterior part.

‡ Anal with 23 to 32 rays. 5. *Yarrella*

‡‡ Anal with 14 to 15 rays. 6. *Vinciguerria*

†† Origin of dorsal fin well in advance of that of anal, which commences at some distance behind it. 7. *Photichthys*

b. An additional series of photophores along the lateral line, and sometimes one or more rows of luminous spots between these and the two abdominal series; no adipose fin.

* Body moderately elongate; dorsal with 10 to 16 rays, origin nearer to base of caudal than end of snout; anal with 26 to 39 rays. 8. *Manducus*

** Body very elongate; dorsal with 9 to 11 rays, origin a little nearer to end of snout than base of caudal; anal with 55 to 63 rays. 9. *Diplophos*

*** Body moderately elongate; dorsal with 10 rays, origin more than twice as near to end of snout as to base of caudal; anal with 56 to 71 rays. 10. *Triplophos*

2. Interorbital region very narrow; eyes telescopic; mouth small, the lower jaw included; teeth minute; origin of dorsal in front of pelvics, which are nearer to base of caudal than end of snout. 11. *Ichthyococcus*

II. Photophores large and conspicuous; serial photophores on body more or less distinctly divided into groups; pseudobranchiae present. (Maurolicinae)

A. Origin of dorsal fin in advance of that of anal.

1. Series of photophores between pelvic and origin of anal separated from that above anterior part of anal fin; origin of dorsal nearer to base of caudal than end of snout; 25 to 27 gill-rakers on lower part of anterior arch. 12. *Maurolicus*

2. Series of photophores between pelvic and origin of anal continuous with that above anterior part of anal fin; origin of dorsal nearer to end of snout than base of caudal; about 16 gill-rakers on lower part of anterior arch. 13. *Argyripnus*

B. Origin of dorsal fin opposite to that of anal; photophores above and behind the anal arranged in four or five small groups, each group on a black background. 14. *Valenciennellus*

Genus **Bonapartia**, Goode and Bean

Goode and Bean, 1895, *Ocean. Ichth.* p. 102.[1]
Zaphotias (Goode and Bean), Jordan and Evermann, 1898, *Bull. U.S. Nat. Mus.* XLVII (3), p. 2826.

Cleft of mouth wide. Both jaws with strong acute teeth set at more or less regular intervals, and with much smaller teeth in the interspaces; a single series of minute teeth on each palatine, somewhat enlarged anteriorly; a patch of similar teeth on the pterygoid. Gill-openings very wide; gill-rakers long, comparatively few in number. Scales large, cycloid. A single series of photophores on either side of the abdomen. Dorsal 19; no adipose fin. Anal 29–30; origin a little in advance of that of dorsal; anterior rays greatly prolonged. Pectoral and pelvic small.

A single species.

Bonapartia pedaliota, Goode and Bean.

Goode and Bean, 1895, *Ocean. Ichth.* p. 102, fig. 120; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 580; Jespersen and Tåning, 1919, *Vid. Medd. Dansk nat. For.* LXX, p. 221, pl. xvii, figs. 7–8.
Zaphotias pedaliotus, Jordan and Evermann, 1898, *ibid.* XLVII (3), p. 2826.

St. 282. 12. viii. 27. 1° 11′ 00″ S, 5° 38′ 00″ E. Young-fish trawl, 300 (–0) m.: 1 specimen, 47 mm.

Depth of body $4\frac{1}{2}$ in the length, length of head $3\frac{3}{5}$. Snout about as long as eye, diameter of which is nearly 4 in length of head and a little greater than interorbital width. About 12 gill-rakers on lower part of anterior arch. About 40 scales in a longi-

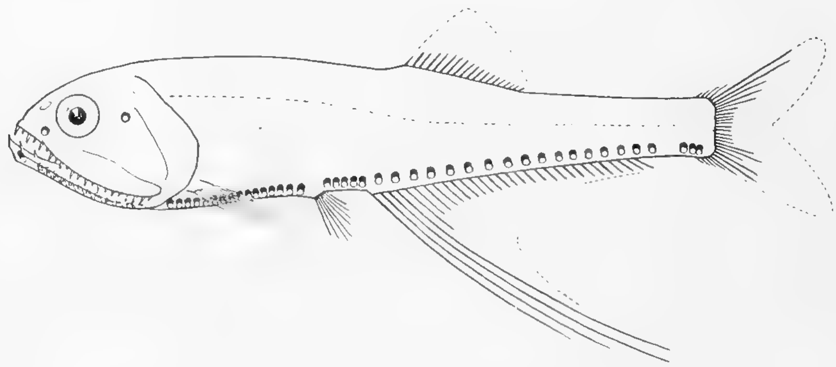

Fig. 6. *Bonapartia pedaliota*. (× 2.)

tudinal series. Dorsal 19; origin equidistant from posterior margin of eye and base of caudal. Anal 29–30; origin equidistant from end of snout and base of caudal; the anterior rays greatly prolonged, the third and fourth about $\frac{1}{2}$ length of fish, reaching caudal when laid back; base of fin more than twice as long as that of dorsal. Pectoral

[1] Goode and Bean's *Oceanic Ichthyology* was first published as a *Special Bulletin of the United States National Museum*, bearing the date 1895 on the title-page. It was subsequently published as *Memoir XXII of the Museum of Comparative Zoology* (1896), and as a *Smithsonian Contribution to Knowledge*, XXX (1896). Büttikofer's note of the name *Bonapartia* (Aves) occurs in *Notes Leyden Museum*, XVIII, June, 1896, p. 58.

with 16 rays. Pelvic 8(?); origin equidistant from end of snout and last anal rays. A pair of photophores at the symphysis of the mandibles and about 12 between the branchiostegal rays; a single photophore in front of the lower corner of the orbit and another in front of the upper part of the operculum; a single series on the abdomen, consisting of 16 from gill-opening to pelvic, 5 from pelvic to origin of anal, 17 from origin of anal to just behind the last ray, and a group of 3 placed close together on lower edge of caudal peduncle.

Described from a single specimen, 47 mm. in length.

Hab. Atlantic.

As has already been pointed out by Jespersen and Tåning, these specimens from the eastern Atlantic differ somewhat from those described by Goode and Bean from off the coast of Florida. According to their original account the jaws are "armed with a single series of not very numerous, acicular teeth, uniform in size...." Further, the pelvic and anal fins are further forward in examples from the eastern Atlantic, the anterior anal rays are more produced, and there are differences in the number and arrangement of the photophores. There are, however, certain discrepancies between the description and the figure in Goode and Bean's work, and I follow Jespersen and Tåning in identifying my specimens as *B. pedaliota*.

Genus **Margrethia**, Jespersen and Tåning

Jespersen and Tåning, 1919, *Vid. Medd. Dansk nat. For.* LXX, p. 222.

Closely allied to *Bonapartia*, differing in the rather more anterior insertion of the dorsal fin, and in the presence of an adipose fin.

A single species.

Margrethia obtusirostra, Jespersen and Tåning.

Jespersen and Tåning, 1919, *t.c.* p. 222, pl. xvii, figs. 11–12.

5 + 7 + 3 gill-rakers on the first arch. Dorsal 16; origin nearer to posterior margin of eye than base of caudal, a little in advance of that of anal. Anal 23–26; anterior rays somewhat longer than those that follow. Pectoral with about 14 rays. Pelvic 8. Photophores on head similar to *Bonapartia*; the single series on the abdomen consisting of 14–15 from gill-opening to pelvic, 4 from pelvic to origin of anal, 13 above the anal fin, and a group of 4 placed close together on the lower edge of the caudal peduncle.

The original description was based on several postlarval and adolescent specimens, $6\frac{3}{4}$ to 19 mm. in length, all taken at a depth of about 150 mm.

Hab. Eastern Atlantic.

Genus **Gonostoma**, Rafinesque

Rafinesque, 1810, *Ind. itt. Sicil.* p. 64.
Sigmops, Gill, 1884, *Proc. U.S. Nat. Mus.* VI (1883), p. 256.
Neostoma, Vaillant, 1888, *Expéd. Sci. 'Travailleur' et 'Talisman', Poissons*, p. 96.
Cyclothone (part), Goode and Bean, 1895, *Ocean. Ichth.* p. 99.

Cleft of mouth wide; both jaws with strong acute teeth set at more or less regular intervals, and with much smaller teeth in the interspaces; a series of minute teeth on

each palatine, with two or three larger ones anteriorly; vomerine teeth present or absent; a patch of minute teeth on each pterygoid. Eye of moderate size. Second suborbital more or less enlarged. No pseudobranchiae; gill-openings very wide; gill-rakers long, comparatively few in number. Scales present or absent. Serial photophores in two rows on each side of the abdomen, or with the upper row irregularly arranged on the side of the body. Dorsal 11–17. Anal 22–31; origin opposite to or in advance of that of dorsal.

Four species.

Synopsis of the Species

I. Second suborbital greatly enlarged, covering the entire cheek; vomer without teeth; body completely covered with scales. 1. *denudatum*

II. Second suborbital moderately enlarged, not nearly covering cheek; vomer with a pair of conical teeth; scales, if present, only developed on anterior and posterior parts of body, and in association with photophores.

A. Origin of anal very little in advance of dorsal; adipose fin present; dorsal with 13 to 16 rays.

1. Eye $6\frac{1}{4}$ to $7\frac{1}{4}$ in head; anal with 29 to 31 rays; photophores conspicuous, arranged in two longitudinal series placed close together near the abdomen. 2. *elongatum*

2. Eye $7\frac{1}{2}$ to 9 in head; anal with 22 to 24 rays; photophores very indistinct, the upper series irregular and situated on side of body. 3. *bathyphilum*

B. Origin of anal well in advance of that of dorsal; dorsal with 11 rays. 4. *gracile*

Gonostoma brevidens (Kner) Steindachner, and *G. raoulensis*, Waite, both belong to the genus *Vinciguerria*.

Gonostoma denudatum, Rafinesque.

Gonostoma denudatum (-*a*), Rafinesque, 1810, *Ind. itt. Sicil.* p. 65; Bonaparte, 1841, *Icon. Faun. Ital.* (27), Indice (4) and (138), fig.; Cuvier and Valenciennes, 1849, *Hist. Nat. Poiss.* XXII, p. 376; Johnson, 1862, *Ann. Mag. Nat. Hist.* (3) X, p. 279; Günther, 1864, *Cat. Fish.* V, p. 391; 1887, *Deep-sea Fish, 'Challenger'*, p. 172; Vaillant, 1888, *Expéd. Sci. 'Travailleur' et 'Talisman', Poissons*, p. 102; Moreau, 1891, *Hist. Nat. Poiss. France, Suppl.* p. 79; Goode and Bean, 1895, *Ocean. Ichth.* p. 98, fig. 116; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 579; Brauer, 1906, *'Valdivia' Tiefsee-Fische*, p. 73, fig. 26; Sanzo, 1912, *Mem. R. Com. Talass. Ital.* IX, p. 1, figs.; Jespersen and Tåning, 1926, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 12, p. 4, figs.

Gasteropelecus acanturus, Cocco, 1829, *Giorn. Sci. Lett. Sicilia*, XXVI, p. 145.

Gonostomus acanthurus, Cocco, 1838, *N. Ann. Sci. Nat.* II, p. 163.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 5 specimens, 28–45 mm.

St. 293. 24. viii. 27. 4° 18′ 15″ N, 16° 51′ 00″ W. Young-fish trawl, 100–120 (–0) m.: 3 specimens, 35–40 mm.

St. 295. 25. viii. 27. 5° 30′ 30″ N, 17° 45′ 00″ W. Young-fish trawl, 2500–2700 m.: 1 specimen, 30 mm.

St. 296. 26. viii. 27. 8° 12′ 00″ N, 18° 49′ 00″ W. Young-fish trawl, 450–500 (–0) m.: 1 specimen, 50 mm.

Depth $5\frac{1}{3}$ to 6 in the length, length of head about 4. Snout about as long as eye, diameter of which is $4\frac{1}{2}$ (young) to $5\frac{3}{4}$ in length of head and about equal to interorbital

width. Second suborbital greatly enlarged, covering entire cheek. Vomer toothless. The whole body covered with thin cycloid scales; about 36 in a longitudinal series. 10 or 11 gill-rakers on lower part of anterior arch. Dorsal 14–16 (17); origin about equidistant from root of pectoral and base of caudal. Adipose fin rather small. Anal 29–31; origin opposite to that of dorsal. Pectoral with 11 or 12 rays. Pelvic 8; origin equidistant from tip of lower jaw and base of caudal or a little nearer the former. A pair of photophores at the symphysis of the mandibles, and a series of nine between the branchiostegal rays; a single photophore in front of the lower corner of the orbit; a narrow vertical streak in front of the operculum, with one luminous spot above and two below; three larger luminous patches at base of caudal fin, one above and two below; lower series of photophores on body consisting of 5 in front of the pectoral fin, 10 or 11 from pectoral to pelvic, 5 from pelvic to origin of anal, and 17–19 from anal to base of caudal; in the upper series there are 13–15 (1 + 9 + 3 + 0–2).

Described from 18 specimens, 28 to 140 mm. in length.

Hab. Mediterranean and Eastern Atlantic.[1]

Two distinct sub-species of *Gonostoma denudatum* may be recognised, and the main differences between them have already been pointed out by Jespersen and Tåning.[2] The true *denudatum* occurs in the Mediterranean and in the neighbouring parts of the Atlantic; the specimen from Madeira described by Johnson belongs to this sub-species. The other, which may be called *atlanticum* (n.subsp.), occurs only in the Eastern Atlantic, and may be recognised chiefly by the greater number of gill-rakers and by the arrangement of the photophores above the origin of the anal fin. The dorsal fin seems to be inserted a little further forward in this form, but my material is not sufficient to be certain of this. The two sub-species may be recognised as follows:—

I. Usually 5 + 10 gill-rakers on the first arch; first two photophores above the anal fin placed much higher than the two which follow, which are themselves situated lower than the remainder. *denudatum*

II. Usually 6 + 11 gill-rakers on the first arch; all the anterior photophores above the anal fin forming an unbroken series at about the same level. *atlanticum*

Gonostoma elongatum, Günther.

Gonostoma elongatum, Günther, 1878, *Ann. Mag. Nat. Hist.* (5) II, p. 187; 1887, *Deep-Sea Fish. 'Challenger'*, p. 173, pl. xlv, fig. B; Alcock, 1891, *Ann. Mag. Nat. Hist.* (6) VIII, p. 127; 1892, *ibid.* (6) X, p. 354; Brauer, 1906, *'Valdivia' Tiefsee-Fische*, p. 75, pl. iv, fig. 4; Weber, 1913, *'Siboga' Fische*, p. 17; Weber and Beaufort, 1913, *Fish. Indo-Austral. Arch.* II, p. 122, fig. 45.

Sigmops stigmaticus, Gill, 1884, *Proc. U.S. Nat. Mus.* VI (1883), p. 256.

Neostoma elongatum, Collett, 1896, *Bull. Soc. zool. France*, XXI, p. 96.

Cyclothone elongata, Goode and Bean, 1895, *Ocean. Ichth.* p. 101, fig. 119; Alcock, 1899, *Cat. Indian Deep-Sea Fish.* p. 139.

Cyclothone (*Sigmops*) *elongata*, Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 583.

[1] According to Goode and Bean this species was taken in the Western Atlantic off the New England coast in 1881, and from off the Californian coast by the 'Albatross'. These specimens have not yet been described.

[2] I am greatly indebted to Mr A. V. Tåning for notes on these sub-species.

Cyclothone rhodadenia, Gilbert, 1905, *Bull. U.S. Fish. Comm.* XXIII (1903), p. 602, pl. lxxi, fig. 1.

Gonostoma polyphos, Zugmayer, 1911, *Bull. Inst. Océan. Monaco*, 193, p. 4; 1911, *Rés. Camp. Sci. Monaco*, XXXV, p. 47, pl. ii, fig. 2; Roule, 1919, *ibid.* LII, p. 27.

?? *Gonostoma rhodadenia*, Weber, 1913, '*Siboga*' *Fische*, p. 18; Weber and Beaufort, 1913, *Fish. Indo-Austral. Arch.* II, p. 121.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. $4\frac{1}{2}$ m. net, horizontal, 2000 (–0) m.: 1 specimen, 200 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 1 specimen, 195 mm.

St. 256. 23. vi. 27. 35° 14′ 00″ S, 6° 49′ 00″ E. Young-fish trawl, 850–1100 (–0) m.: 1 specimen, 200 m.

St. 280. 10. viii. 27. 00° 36′ 00″ S, 8° 28′ 00″ E. Young-fish trawl, 100–200 (–0) m.: 1 specimen, 135 mm.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850–950 (–0) m.: 1 specimen, 42 mm.

St. 282. 12. viii. 27. 1° 11′ 00″ S, 5° 38′ 00″ E. Young-fish trawl, 300 (–0) m.: 1 specimen, 160 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56 30″ W. $4\frac{1}{2}$ m. net, horizontal, 125–175 (–0) m.: 7 specimens, 140–180 mm.

St. 286. 17. viii. 27. 3° 06′ 30″ S, 3° 53′ 00″ W. Young-fish trawl, 125 (–0) m.: 1 specimen, 55 mm.

Depth of body $6\frac{3}{4}$ to $7\frac{1}{4}$ in the length, length of head $4\frac{3}{5}$ to $4\frac{4}{5}$. Snout as long as or a little longer than eye, diameter of which is $6\frac{1}{4}$ to $7\frac{1}{4}$ in length of head and $1\frac{1}{5}$ to $1\frac{1}{3}$ in the interorbital width. Suborbital moderately enlarged, not covering the entire cheek. Vomer with a pair of conical teeth. Scales mostly wanting, but sometimes traces of scales associated with photophores immediately behind the head and in the tail region. About 12 gill-rakers on the lower part of the anterior arch. Dorsal 13–15; origin somewhat nearer to root of pectoral than base of caudal. Adipose fin well developed. Anal 29–31; origin very little in advance of that of dorsal. Pectoral with 11–13 rays. Pelvic 8; origin much nearer to tip of lower jaw than base of caudal. Photophores conspicuous; a pair at the symphysis of the mandibles and a series of 8 or 9 between the branchiostegal rays; a luminous patch below the eye and immediately above the jaw, connected with a photophore in front of the lower corner of the orbit; a small indistinct spot behind the end of the maxillary, and another on the upper part of the praeoperculum, the latter connected with a vertical luminous streak; one supracaudal and two infracaudal patches as in the preceding species; lower series of photophores on body consisting of 4 in front of the pectoral fin, 11 from pectoral to pelvic, 4 from pelvic to origin of anal, and 19–22 from anal to base of caudal; in the upper series there are 14 or 15 (8–9 + 3–4 + 2–3). Uniformly blackish.

Described from 16 specimens, 55 to 200 mm. in length, including the types of the species.

Hab. North and South Atlantic; Indian Ocean; Hawaiian Islands.

Gonostoma bathyphilum (Vaillant).

Neostoma bathyphilum, Vaillant, 1884, *La Nature*, XXII, p. 184, fig.; 1888, *Expéd. Sci. 'Travailleur' et 'Talisman'*, *Poissons*, p. 96, pl. viii, fig. 1.

Cyclothone bathyphila, Goode and Bean, 1895, *Ocean. Ichth.* p. 100, fig. 118.

? *Gonostoma brevidens*, Goode and Bean, *t.c.* p. 98, fig. 117.

Cyclothone grandis, Collett, 1896, *Bull. Soc. zool. France*, XXI, p. 99.

Gonostoma bathyphilum, Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 73; Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, XXXV, p. 49, pl. ii, fig. 1; Holt and Byrne, 1913, *Fisheries, Ireland, Sci. Invest.* 1912, I, p. 11, figs. 3–4; Roule, 1919, *Rés. Camp. Sci. Monaco*, LII, p. 27.

Gonostoma grandis, Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 143.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. 4½ m. net, horizontal, 650 (–0) m.: 2 specimens, 29–35 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 3 specimens, 30–70 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net, horizontal, 850–950 m.: 1 specimen, 60 mm. 4½ m. net, horizontal, 1310–1410 m.: 3 specimens, 80–130 mm.

Depth of body 6½ to 6⅘ in the length, length of head 4 to 4⅓. Snout longer than eye, diameter of which is 7½ to 9 in length of head and nearly twice in the interorbital width. Suborbital moderately enlarged, not covering entire cheek. A pair of conical teeth on the vomer. Scales absent. About 15 gill-rakers on lower part of anterior arch. Dorsal 12–14; origin about equidistant from occipital region and base of caudal. Adipose fin well developed. Anal 22–24; origin very little in advance of that of dorsal. Pectoral with 7–10 rays. Pelvic 7 or 8; origin much nearer to tip of lower jaw than base of caudal. Photophores small and indistinct; a series between the branchiostegal rays; a narrow luminous streak below the eye, and another on the praeoperculum; one supracaudal and two infracaudal luminous patches; lower series of photophores on body consisting of 2 or 3 in front of the pectoral fin, 8 or 9 from pectoral to pelvic, 3 from pelvic to origin of anal, and 19–20 from anal to base of caudal; the upper series, consisting of 14 photophores irregularly arranged on the side of the body, ends opposite to the origin of the dorsal fin. Uniformly blackish.

Described from 13 specimens, 29 to 130 mm. in length.

Hab. North and South Atlantic.

Gonostoma brevidens (Kner and Steindachner), Goode and Bean, from the Western Atlantic, may be this species, but there are several discrepancies between their description and figure. The number of anal rays, for example, is given as 17–19, but about 26 are shown in the figure. I am indebted to the Director of the Museum of Comparative Zoology, Cambridge, Mass., for some young examples collected by the 'Blake' and identified as this species, but these prove to be *Cyclothone microdon*.

Gonostoma gracile, Günther.

Gonostoma gracile, Günther, 1878, *Ann. Mag. Nat. Hist.* (5), II, p. 187; 1887, *Deep-Sea Fish. 'Challenger'*, p. 174, pl. xlv, fig. C.

Neostoma gracile, Collett, 1896, *Bull. Soc. zool. France*, XXI, p. 96; Jordan, Tanaka and Snyder, 1913, *J. Coll. Sci. Tokyo*, XXXIII (1), p. 50.

Depth of body 8 to 9 in the length, length of head about 5. Snout about as long as eye, diameter of which is 6 to $6\frac{1}{2}$ in length of head and about equal to interorbital width. Suborbital moderately enlarged, not covering entire cheek. A pair of conical teeth on the vomer. Scales apparently absent. About 13 gill-rakers on lower part of anterior arch. Dorsal 11; origin about equidistant from gill-opening and base of caudal. No adipose fin. Anal 26–27; origin well in advance of that of dorsal. Pectoral with 11 rays. Pelvic 7; origin much nearer to tip of lower jaw than base of caudal. Photophores rather small and indistinct; a series between the branchiostegal rays; a luminous patch below the eye, in front of which is a small photophore; another, but smaller patch on the praeoperculum; one supracaudal (?) and two infracaudal luminous patches; some scattered photophores on sides of body in addition to the two rows on the abdomen; lower series of photophores consisting of 10 from pectoral to pelvic, 3 or 4 from pelvic to origin of anal, and 16 (?) from anal to base of caudal; there appear to be 7 in the upper series; an oblique row of 5 photophores is present on the isthmus, running upwards to the base of the pectoral fin. Uniformly blackish.

Described from two specimens, 58 to 110 mm. in length; types of the species.

Hab. South of Japan.

Genus **Cyclothone**, Goode and Bean

Goode and Bean, 1883, *Bull. Mus. Comp. Zool.* X, p. 221; Collett, 1896, *Bull. Soc. zool. France*, XXI, p. 96.

Close to *Gonostoma*, but with a small eye; second suborbital not enlarged; praemaxillary with few teeth; maxillary with a series of small teeth, increasing in size from before backwards, some of them at more or less irregular intervals somewhat enlarged. Dorsal 13 to 15. Adipose fin present or absent. Anal 16 to 20; origin about opposite to that of dorsal.

About six species.

I have not attempted a revision of the species of this genus, as my material is quite inadequate. Further, a good revision has been published by Brauer in 1906 ('*Valdivia*' *Tiefsee-Fische*, p. 77), and, apart from an important paper by Jespersen and Tåning (1926, *Rep. Danish Ocean. Exped.* 1908–1910, II, A, 12, p. 7), based on extensive material from the Mediterranean and the adjacent parts of the Atlantic, little has been added to our knowledge of the group since that date.[1]

Cyclothone signata, Garman.

Garman, 1899, *Mem. Mus. Comp. Zool.* XXIV, p. 246, pl. J, fig. 3.

Hab. Gulf of Panama; Atlantic (?).

[1] Pappenheim (1914, *Deutsche Südpolar-Exped.* XV, Zool. VII) has listed a number of specimens of *Cyclothone* from the North and South Atlantic, but gives no descriptions. See also Roule (1919, *Rés. Camp. Sci. Monaco*, LII, p. 27).

Cyclothone signata alba, Brauer.

Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 80, fig. 30.

Hab. Atlantic and Indian Oceans.

Cyclothone braueri, Jespersen and Tåning.

Cyclothone signàta (*non* Garman), Brauer, *t.c.* p. 78, pl. vi, fig. 6, text-figs. 28, 29.

Cyclothone braueri, Jespersen and Tåning, 1926, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 12, p. 7, figs.

St. 89. 28. vi. 26. 34° 05′ 15″ S, 16° 00′ 45″ E. Young-fish trawl, 1000 (–0) m.: 43 specimens, 15–42 mm.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 60 specimens, 23–58 mm.

16. x. 25. 29° 26′ N, 15° 07′ W. 2 m. tow-net, horizontal, 900 (–0) m.: 28 specimens, 13–37 mm.

Hab. Mediterranean; North and South Atlantic; Caribbean Sea.

Cyclothone livida, Brauer.

Brauer, 1902, *Zool. Anz.* XXV, p. 279; 1906, '*Valdivia*' *Tiefsee-Fische*, p. 80, pl. vi, fig. 5, text-fig. 31.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850–950 (–0) m.: 40 specimens, 20–42 mm.

St. 298. 29. viii. 27. 13° 01′ 45″ N, 21° 34′ 45″ W. Young-fish trawl, 900–1200 (–0) m.: 7 specimens, 23–35 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 31 specimens, 25–50 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 12 specimens, 21–53 mm.

Hab. North and South Atlantic.

Cyclothone microdon (Günther).[1]

Günther, 1878, *Ann. Mag. Nat. Hist.* (5), II, p. 187; 1887, *Deep-Sea Fish. 'Challenger'*, p. 175; Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 82, pl. vi, fig. 4, text-fig. 32; Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, XXXV, p. 43; Regan, 1916, *Larval Fish. 'Terra Nova'*, p. 137, pl. v, fig. 5.

Neostoma quadrioculatum, Vaillant, 1888, *Expéd. Sci. 'Travailleur' et 'Talisman', Poissons*, p. 99, pl. viii, fig. 2.

The 'Discovery' obtained more than 500 specimens of this species from the following stations in the North and South Atlantic, at depths ranging from 0–2500 m., measuring from 12 to 70 mm. in length: St. 9, 71, 72, 76, 78, 79, 81, 85, 86, 87, 89, 100, 151, 169, 239, 245, 256.[2]

Hab. Arctic Ocean; North and South Atlantic; Antarctic Ocean; Indian Ocean; Pacific.

[1] For full synonymy see Brauer (1906).

[2] A list of these stations is given at the beginning of this report.

Cyclothone microdon pallida, Brauer.

Brauer, 1902, *Zool. Anz.* xxv, p. 281; 1906, '*Valdivia*' *Tiefsee-Fische*, p. 84, pl. vi, fig. 2, text-fig. 33; Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, xxxv, p. 44, pl. II, fig. 3.

Hab. Atlantic and Indian Oceans.

Cyclothone microdon pygmaea, Jespersen and Tåning.

Jespersen and Tåning, 1926, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 12, p. 7, figs.

Hab. Mediterranean and neighbouring parts of the Atlantic.

Cyclothone acclinidens, Garman.

Garman, 1899, *Mem. Mus. Comp. Zool.* XXIV, p. 247, pl. J, fig. 4; Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 85, pl. vi, fig. 1, text-fig. 34.

Hab. Atlantic and Indian Oceans; Pacific.

Cyclothone atraria, Gilbert.

Gilbert, 1905, *Bull. U.S. Fish. Comm.* XXIII (1903), p. 605, pl. lxxii, fig. 2.

Hab. Hawaiian Islands.

Cyclothone canina, Gilbert.

Gilbert, 1905, *t.c.* p. 604, pl. lxxi, fig. 2.

Hab. Hawaiian Islands.

Cyclothone obscura, Brauer.

Brauer, 1902, *Zool. Anz.* xxv, p. 280; 1906, '*Valdivia*' *Tiefsee-Fische*, p. 88, pl. vi, fig. 3, text-fig. 35.

St. 295. 25. viii. 27. 5° 30′ 30″ N, 17° 45′ 00″ W. Young-fish trawl, 2500–2700 (–0) m.: 5 specimens, 25–60 mm. (?).

Hab. Atlantic and Indian Oceans.

Genus **Yarrella**, Goode and Bean

Goode and Bean, 1895, *Ocean. Ichth*, p. 103.

Polymetme, McCulloch, 1926, *Biol. Res.* '*Endeavour*', v, p. 166.

Close to *Gonostoma*, but whole of body covered with deciduous scales. Photophores conspicuous. Dorsal 10–12. Anal 23–32; origin below middle or posterior part of dorsal.

Two species.

Yarrella blackfordi, Goode and Bean.

Goode and Bean, 1895, *Ocean. Ichth.* p. 103, fig. 121; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 584, fig. 249; Jespersen and Tåning, 1919, *Vid. Medd. Dansk nat. For.* LXX, p. 223, pl. xvii, fig. 13.

St. 273. 31. vii. 27. 9° 38′ 00″ S, 12° 42′ 30″ E. 1 m. tow-net, oblique, 118 (–0) m.: 8 specimens, 33–45 mm.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. 1 m. tow-net, oblique, 110 (–0) m.: 2 specimens, 40–50 mm.

Depth of body $6\frac{1}{2}$ to 7 in the length, length of head $4\frac{1}{2}$ to $4\frac{3}{4}$. Snout somewhat longer than eye, diameter of which is $4\frac{1}{4}$ to $5\frac{1}{4}$ in length of head and about equal to interorbital width. About 12 gill-rakers on lower part of anterior arch. Dorsal 10–12; origin about equidistant from base of caudal and anterior margin of eye. Anal 23–30; origin below middle of dorsal. Pectoral with 8 rays. Pelvic 7; origin equidistant from tip of lower jaw and posterior part of anal. Lower series of photophores consisting of 9 in front of pectoral, 12 or 13 from pectoral to pelvic, 7 or 8 from pelvic to origin of anal, and 20 or 21 from anal to base of caudal; there are 19 or 20 photophores in the upper series.

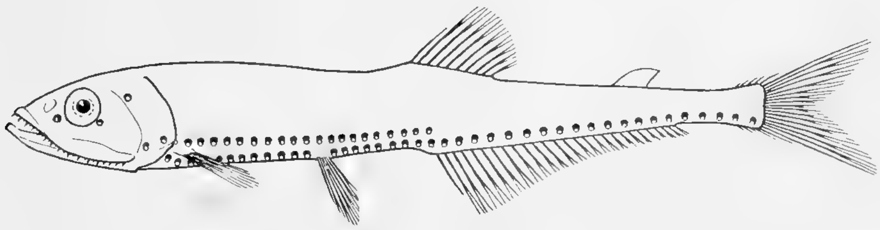

Fig. 7. *Yarrella blackfordi.* (× $2\frac{1}{2}$.)

Described from 16 specimens, 28 to 50 mm. in length.

Hab. Atlantic.

The above specimens differ in several respects from the description of Goode and Bean, but in view of their small size I have followed Jespersen and Tåning in identifying them with that species.

Yarrella corythaeola (Alcock).

Diplophos corythaeolum, Alcock, 1898, *Ann. Mag. Nat. Hist.* (7), II, p. 147; 1899, *Illust. Zool. 'Investigator', Fishes*, pl. xxv, fig. 3.

Photichthys corythaeolus, Alcock, 1899, *Cat. Indian Deep-Sea Fish.* p. 142.

Yarrella africana, Gilchrist and Von Bonde, 1924, *Rep. Fish. Mar. Biol. Surv. S. Afr.* III (1922), *Spec. Rep.* VII, p. 8, pl. i, fig. 2; Barnard, 1925, *Ann. S. Afr. Mus.* XXI, p. 148.

Polymetme illustris, McCulloch, 1926, *Biol. Res. 'Endeavour'*, V, p. 167, pl. xlv, fig. 1.

Depth of body 5 to 6 in the length, length of head 4 to $4\frac{3}{5}$. Snout as long as or a little shorter than eye, diameter of which is 4 to $4\frac{1}{4}$ in length of head and a little greater than interorbital width. About 12 gill-rakers on lower part of anterior arch. Dorsal 11–12; origin about equidistant from end of snout and base of caudal. Anal 24–32; origin below last rays of dorsal. Pectoral with 10 or 11 rays. Pelvic 7; origin equidistant from tip of lower jaw and last rays of anal. Lower series of photophores consisting of 9 in front of pectoral, 11 from pectoral to pelvic, 8 from pelvic to origin of anal, and 22–24 from anal to base of caudal; there are 18–19 photophores in the upper series.

Described from 2 specimens, 103 and 130 mm. in length; one is the type of *Diplophos corythaeolum*, and the other a paratype of *Polymetme illustris* received in exchange from the Australian Museum.

Hab. Coast of Natal; Andaman Sea; Southern Australia.

I have no hesitation in uniting these three species. The number and arrangement of the photophores is exactly the same in all of them, and the only difference is in the number of anal rays—about 24 in *corythaeola*, 27–32 in *illustris*, and 25 in *africana*.

Genus Vinciguerria, Goode and Bean

Poweria, Bonaparte, 1840, *Icon. F. Ital.* III (under *Ichthyococcus poweriae*), sign. 1838** [2].

Vinciguerria (Jordan and Evermann), Goode and Bean, 1895, *Ocean. Ichth.* p. 513; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 577.

Zalarges (Jordan and Williams) Jordan and Starks, 1895, *Proc. Calif. Acad. Sci.* (2), V, p. 793.

Close to *Gonostoma* and *Yarrella*. Both jaws with a single series of teeth of varying sizes; teeth present on vomer, palatines and pterygoids. Scales developed. Photophores conspicuous. Dorsal 13–14. Anal 14–15; origin below middle or posterior part of dorsal.

Five or six species.

I have not sufficient material to undertake a revision of this genus, but give a list of the species, with a fairly complete synonymy in each case. The species are so close to one another that in many cases it is impossible to be certain as to which one any particular author was considering unless a reliable figure is provided. For this reason, the synonymies given below cannot be regarded as more than tentative. Jespersen and Tåning have given a full account of the two Mediterranean species (*V. poweriae* and *V. attenuata*) and have pointed out the characters which distinguish these from *V. sanzoi* and *V. lucetia*. The four species may be recognised as follows:—

I. No photophores at the symphysis of the mandibles.

A. Length of row of photophores from origin of anal to base of caudal shorter than head; 12 (occasionally 11) gill-rakers on lower part of anterior arch. 1. *poweriae*

B. Length of row of photophores from origin of anal to base of caudal longer than head; usually 14 gill-rakers on lower part of anterior arch. 2. *attenuatus*

II. A pair of photophores at the symphysis of the mandibles.

A. 24–25 (13 + 11–12) photophores in the upper series; 13–14 gill-rakers on lower part of anterior arch; dorsal with 14–15 rays; anal with 13–15 rays. 3. *sanzoi*

B. 21–22 (11–12 + 10–11) photophores in the upper series; 19–20 gill-rakers on lower part of anterior arch; dorsal with 13–14 rays; anal with 14–16 rays. 4. *lucetia*[1]

Vinciguerria poweriae (Cocco).

Gonostomus poweriae, Cocco, 1838, *N. Ann. Sci. Nat.* II, p. 167.

Ichthyococcus poweriae, Bonaparte, 1841, *Icon. F. Ital.* (27), Indice [4] and (138**), fig.

Scopelus poweriae, Cuvier and Valenciennes, 1849, *Hist. Nat. Poiss.* XXII, p. 441.

[1] *Gonostoma brevidens* (Kner) Steindachner (1870, *SitzBer. K. Akad. Wiss. Wien*, LXI (1), p. 443) seems to be a species of *Vinciguerria*, but I am unable to identify this.

Maurolicus poweriae, Günther, 1864, *Cat. Fish.* v, p. 390; Facciola, 1883, *Nat. Sicil.* II, p. 207; Carus, 1889–93, *Prodr. F. Medit.* II, p. 569.; Lütken, 1892, *Vid. Selsk. Skr.* (6), VII, p. 272.

Vinciguerria lucetia, Murray and Hjort, 1912, *Depths of the Ocean*, p. 604, fig. 457, p. 678, fig. 495.

Vinciguerria poweriae, Sanzo, 1913, *Mem. R. Com. Talass. Ital.* XXXV, p. 3, figs.; Jespersen and Tåning, 1919, *Vid. Medd. Dansk nat. For.* LXX, p. 218, pl. xvii, figs. 1–4; 1926, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 12, p. 22, figs.

Hab. Mediterranean; Atlantic.

Vinciguerria attenuata (Cocco).[1]

Maurolicus attenuatus, Cocco, 1838, *N. Ann. Sci. Nat.* II, p. 193; Bonaparte, 1841, *Icon. F. Ital.* (27), Indice [4] and (138), fig.; Günther, 1864, *Cat. Fish.* v, p. 390; Facciola, 1883, *Nat. Sicil.* II, p. 208; Carus, 1889–93, *Prodr. F. Medit.* II, p. 569; Lütken, 1892, *Vid. Selsk. Skr.* (6), VII, p. 272.

Scopelus tenorei, Cuvier and Valenciennes, 1849, *Hist. Nat. Poiss.* XXII, p. 441.

Vinciguerria attenuata, Goode and Bean, 1895, *Ocean. Ichth.* p. 513; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 577; Sanzo, 1913, *Mem. R. Com. Talass. Ital.* XXXV, p. 3, figs.; Jespersen and Tåning, 1919, *Vid. Medd. Dansk nat. For.* LXX, p. 218, pl. xvii, figs. 3 and 6; 1926, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 12, p. 22, figs.

Vinciguerria lucetia (part), Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 97.

Vinciguerria lucetia, Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, XXXV, p. 56, pl. ii, fig. 4.

St. 78. 12. vi. 26. 35° 18′ 00″ S, 19° 01′ 10″ W. Young-fish trawl, 1000 (–0) m.: 2 specimens, 20–24 mm.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. 4½ m. net, horizontal, 2000 (–0) m.: 4 specimens, 20–35 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 7 specimens, 22–35 mm.

St. 89. 28. vi. 26. 34° 05′ 15″ S, 16° 00′ 45″ E. Young-fish trawl, 1000 (–0) m.: 3 specimens, 17–22 mm.

St. 252. 20. vi. 27. 35° 26′ 00″ S, 1° 43′ 30″ E. 1 m. tow-net, horizontal, 135 m.: 3 specimens, 18–26 mm.

St. 254. 21. vi. 27. 35° 04′ 00″ S, 6° 49′ 00″ E. Young-fish trawl, 200 (–0) m.: 8 specimens, 16–45 mm.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. Young-fish trawl, 250 (–0) m.: 21 specimens, 18–26 mm.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 1 specimen, 20 mm.

Hab. Mediterranean; Atlantic.

[1] Leidenfrost (1917, *Allatt. Kozlem. Budapest*, XVI, p. 13, figs. 1–3) describes several postlarval and juvenile specimens of a species said to be *Vinciguerria attenuata*. His first figure represents a true *Vinciguerria*, probably *V. poweriae*, the second is a young stage of *Ichthyococcus*, and fig. 3 is probably a larval *Chauliodus*.

Vinciguerria sanzoi, Jespersen and Tåning.

Vinciguerria lucetia (part), Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 97.

Vinciguerria sanzoi, Jespersen and Tåning, 1919, *Vid. Medd. Dansk nat. For.* LXX, p. 218, pl. xvii, figs. 2 and 5; 1926, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 12, pp. 22, etc., figs.

St. 295. 25. viii. 27. 5° 30′ 30″ N, 17° 45′ 00″ W. Young-fish trawl, 2500–2700 (–0) m.: 1 specimen, 47 mm.

St. 297. 28. viii. 27. 12° 08′ 00″ N, 20° 53′ 30″ W. Young-fish trawl, 200–300 (–0) m.: 2 specimens, 20–27 mm.

Hab. Atlantic.

Vinciguerria lucetia (Garman).

Maurolicus lucetius, Garman, 1899, *Mem. Mus. Comp. Zool.* XXIV, p. 242, pl. J, fig. 2.

? *Vinciguerria lucetia* (part), Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 97.

Vinciguerria lucetia, Gilbert, 1908, *Mem. Mus. Comp. Zool.* XXVI, p. 237; Weber, 1913, '*Siboga*' *Fische*, p. 21; Weber and Beaufort, 1913, *Fish. Indo-Austral. Arch.* II, p. 119, fig. 44; Regan, 1916, *Larval Fish.* '*Terra Nova*', p. 137, pl. v, figs. 6–7.

Hab. South Atlantic; Indo-Pacific.

Vinciguerria raoulensis (Waite).

Gonostoma raoulensis, Waite, 1910, *Trans. N. Zealand Inst.* XLII, p. 373, pl. xxxv, fig. 1.
Vinciguerria raoulensis, McCulloch, 1923, *Rec. Austral. Mus.* XIV, p. 115.

Hab. Kermadec Islands.

Perhaps identical with *V. lucetia*.

Vinciguerria nimbarius (Jordan and Starks).

Zalarges nimbarius (Jordan and Williams), Jordan and Starks, 1895, *Proc. Calif. Acad. Sci.* (2), V, p. 793, pl. lxxvi.

Vinciguerria nimbarius, Gilbert, 1908, *Mem. Mus. Comp. Zool.* XXVI, p. 237.

Hab. Pacific.

Apparently very close to *V. poweriae*.

Genus **Photichthys**, Hutton

Phosichthys, Hutton, 1872, *Cat. Fish. N. Zealand*, p. 55.
Photichthys, Hutton, 1873, *Trans. N. Zealand Inst.* V, p. 269.

Cleft of mouth wide; maxillary with a single series of small, subequal teeth; praemaxillary with two strong canines in addition to the small teeth; mandible with strong acute teeth and with smaller teeth in the interspaces; a pair of teeth on the vomer; each palatine with a single series of curved teeth, the anterior of which are enlarged; pterygoids toothless. Suborbital not enlarged. Scales present. Photophores conspicuous. Dorsal 12–13; origin behind pelvics but well in advance of anal. Adipose fin developed. Anal 23–26; origin well behind last dorsal ray.

A single species.

Photichthys argenteus, Hutton. [Pl. II, figs. 1 and 2.]

Phosichthys argenteus, Hutton, 1872, *Cat. Fish. N. Zealand*, p. 56.

Photichthys argenteus, Hutton, 1873, *Trans. N. Zealand Inst.* v, p. 269, pl. xv; Günther, 1887, *Deep-Sea Fish. 'Challenger'*, p. 178, pl. xlv, fig. A; Goode and Bean, 1895, *Ocean. Ichth.* p. 104, fig. 122; Brauer, 1906, *'Valdivia' Tiefsee-Fische*, p. 92, fig. 37; Gilchrist, 1922, *Rep. Fish. Mar. Biol. Surv. S. Afr.* II, *Spec. Rep.* III, p. 55; Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 150.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 650 (–0) m.: 3 specimens, 68–75 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 1 specimen, 40 mm.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 1 specimen, 27 mm.

St. 89. 28. vi. 26. 34° 05′ 15″ S, 16° 00′ 45″ E. Young-fish trawl, 1000 (–0) m.: 2 specimens, 18–31 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 350–400 (–0) m.: 12 specimens, 28–165 mm.

St. 258. 25. vi. 27. 35° 03′ 30″ S, 13° 55′ 00″ E. Young-fish trawl, 320–450 m.: 9 specimens, 24–32 mm.

Depth of body $6\frac{1}{4}$ to $6\frac{1}{2}$ in the length, length of head $4\frac{1}{2}$ to $4\frac{4}{5}$. Snout equal to or shorter than eye, diameter of which is 4 to $4\frac{4}{5}$ in length of head and about equal to interorbital width. About 11 gill-rakers on lower part of anterior arch. Dorsal 12–13; origin a little behind root of pelvic, equidistant from end of snout and base of caudal or a little nearer the former. Anal 23–26. Pectoral with 9 rays. Pelvic 7; origin equidistant from base of pectoral and vent. Lower series of photophores consisting of 10 in front of pectoral, 14 or 15 from pectoral to pelvic, 15 or 16 from pelvic to origin of anal, and 16 or 17 from anal to base of caudal; there are 33–34 (14 + 19 – 20) photophores in the upper series.

Described from 11 specimens, 27–240 mm. in length, including the type of the species.

Hab. Atlantic; New Zealand.

Genus **Manducus**, Goode and Bean

Goode and Bean, 1895, *Ocean. Ichth.* p. 514.

Lychnopoles, Garman, 1899, *Mem. Mus. Comp. Zool.* XXIV, p. 244.

Eye of moderate size; second suborbital not greatly enlarged. Cleft of mouth wide, the praemaxillary forming quite half the margin of the upper jaw; praemaxillary and mandible with one or two irregular series of unequal teeth, maxillary with a single series; each palatine with a single row of teeth, the anterior of which are enlarged; two groups of small teeth on the vomer; a patch of minute teeth on each pterygoid. No pseudobranchiae; gill-openings very wide; gill-rakers rather long, comparatively few in number. Scales present. Two series of conspicuous photophores along each side of the abdomen, another row along the region of the lateral line, and some additional series of smaller and less distinct spots on the sides. Dorsal 10–16; origin nearer to base of

caudal than end of snout. No adipose fin. Anal 26–39; origin below or a little behind dorsal.

Two species.

Synopsis of the Species

I. Praemaxillary armed with strong canines; dorsal fin wholly in advance of anal. 1. *maderensis*

II. Praemaxillary without marked canines; dorsal fin mainly above anal. 2. *argenteolus*

Manducus maderensis (Johnson).

Gonostoma maderense, Johnson, 1890, *Proc. Zool. Soc.* p. 458.

Manducus maderensis, Goode and Bean, 1895, *Ocean. Ichth.* p. 515.

Diplophos minutus, Jespersen and Tåning, 1919, *Vid. Medd. Dansk nat. For.* LXX, p. 224, pl. xvii, fig. 15.

Diplophos moorei, Welsh, 1923, *Proc. U.S. Nat. Mus.* LXII (3), p. 1, fig. 1.

Depth of body nearly 7 in the length, length of head 5. Snout a little longer than eye, diameter of which is 5 in length of head and a little less than interorbital width. Each praemaxillary with 5 canine teeth and with much smaller teeth between them. Nine gill-

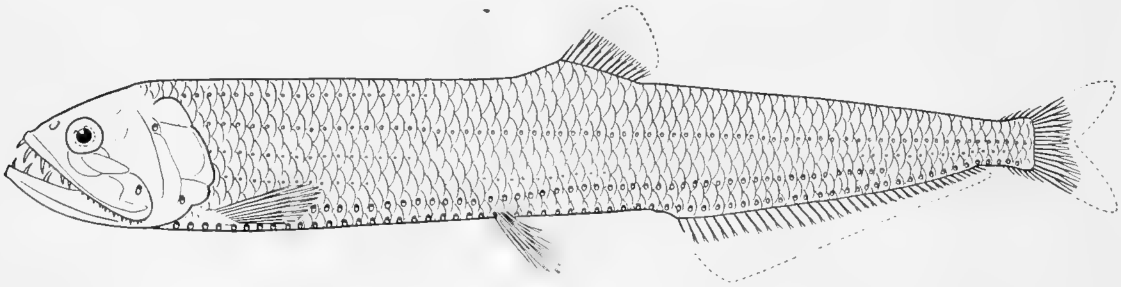

Fig. 8. *Manducus maderensis*. Holotype. (× 1.)

rakers on lower part of anterior arch. Dorsal 12; origin equidistant from eye and base of caudal. Anal 36 (?); origin a little behind last dorsal ray. Pectoral with 9 or 10 rays. Pelvic 8; origin about equidistant from tip of lower jaw and last anal ray. Lower series of photophores consisting of 11 in front of pectoral, 19 from pectoral to pelvic, 13 (1 + 12) from pelvic to origin of anal, and 28 from anal to base of caudal; there are 46 (18 + 15 + 13) in the upper abdominal series and about 65 in the lateral line.

Described from a single specimen, 135 mm. in length; type of the species.

Hab. North Atlantic.

Manducus argenteolus (Garman).

Lychnopoles argenteolus, Garman, 1899, *Mem. Mus. Comp. Zool.* XXIV, p. 244, pl. liii, fig. 4.

Depth of body 7 in the length, length of head a little more than 5. Snout longer than eye, diameter of which is 5 in length of head and a little less than interorbital width. Each praemaxillary with two series of teeth, alternating, none of them distinctly enlarged. Fourteen gill-rakers on lower part of anterior arch. Dorsal 14–16; origin equidistant

from eye and base of caudal. Anal 26–29; origin below sixth ray of dorsal. Pectoral with 9 rays. Pelvic 7; origin equidistant from tip of lower jaw and posterior part of anal. Lower series of photophores consisting of 9 in front of pectoral, 15 from pectoral to pelvic, 9 from pelvic to vent, and 22 from vent to base of caudal; there are 43 (11 + 10 + 22) photophores in the upper abdominal series.

Hab. Gulf of Panama.

Garman does not give the length of the type specimen.

Genus **Diplophos**, Günther

Günther, 1873, *J. Mus. Godeffroy*, II, p. 101; 1889, *Pelagic Fish. 'Challenger'*, p. 32.

Related to *Manducus*. Form very elongate. Praemaxillary, maxillary and mandible each with a single series of small unequal teeth; 2 or 3 teeth on the vomer and a single series on each palatine. Two series of conspicuous photophores on each side of the abdomen, and another series along the lateral line. Dorsal 9–11; origin a little nearer to end of snout than base of caudal. Anal 55–63; origin below dorsal.

One or two species.

Diplophos taenia, Günther.

Günther, 1873, *J. Mus. Godeffroy*, II, p. 102, fig.; 1889, *Pelagic Fish. 'Challenger'*, p. 32, pl. iv, fig. C; Lütken, 1892, *Vid. Selsk. Skr.* (6), VII, p. 278, pl. II, figs. 1–3; Goode and Bean, 1895, *Ocean. Ichth.* p. 104; Brauer, 1906, *'Valdivia' Tiefsee-Fische*, p. 89, fig. 36; Jespersen and Tåning, 1919, *Vid. Medd. Dansk nat. For.* LXX, p. 224, pl. xvii, fig. 14; Gilchrist, 1922, *Fish. Mar. Biol. Surv. S. Afr.* II, *Spec. Rep.* III, p. 55; Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 149.

? *Diplophos pacificus*, Günther, 1889, *Pelagic Fish. 'Challenger'*, p. 33, pl. iv, fig. B; Goode and Bean, 1895, *Ocean. Ichth.* pl. xxxiv, fig. 126.

St. 297. 28. viii. 27. 12° 08′ 00″ N, 20° 53′ 30″ W. Young-fish trawl, 200–300 (–0) m.: 1 specimen, 32 mm.

Depth of body 10 to 16 in the length, length of head 6 to 7. Snout longer than eye, diameter of which is 5 to 6 in length of head and about equal to interorbital width. Dorsal 9–11. Anal 55–63. Pectoral with 8 or 9 rays. Pelvic 8; origin about equidistant from tip of lower jaw and middle of anal. Lower series of photophores consisting of 104–112, upper series of 69–73; there are about 94 photophores in the lateral line.

Described from 5 specimens, 32–44 mm. in length, including the type of the species.

Hab. Atlantic; coast of Natal; Indian Ocean; (?) Pacific.

The counts of dorsal and anal rays, and of the serial photophores, given above are only approximate, as all my material is of small size.

In view of the variation recorded for *D. taenia* by Brauer and others it is very doubtful whether *D. pacificus* can be retained as a distinct species. The type is in poor condition and has been mounted in glycerine as a microscopic preparation.

Genus **Triplophos**, Brauer

Brauer, 1902, *Zool. Anz.* xxv, p. 282; 1906, '*Valdivia*' *Tiefsee-Fische*, p. 98.

Close to *Diplophos*, but with a short, blunt snout, and the body moderately elongate. Two series of conspicuous photophores on each side of the abdomen, and two or more additional rows on the sides of the body. Dorsal 10; origin more than twice as near to end of snout as to base of caudal. Anal 57–61; origin immediately behind dorsal.

A single species.

Triplophos hemingi (McArdle).

Photichthys hemingi, McArdle, 1901, *Ann. Mag. Nat. Hist.* (7), VIII, p. 521; 1905, *Illust. Zool.* '*Investigator*', *Fishes*, pl. xxxvi, fig. 2.

Triplophos elongatum, Brauer, 1902, *Zool. Anz.* xxv, p. 282; 1906, '*Valdivia*' *Tiefsee-Fische*, p. 99, pl. vii, fig. 4, text-fig. 41.

Depth of body nearly 8 in the length, length of head 7. Snout shorter than eye, diameter of which is 6 in length of head and about equal to interorbital width. Teeth arranged in two irregular series in the upper jaw and in a single series in the lower; strong, pointed, with smaller ones in the interspaces; a few small teeth at the anterior end of each palatine and one or two minute teeth on the vomer; surfaces of the mesopterygoids minutely denticulated. Dorsal 10. Anal (57) 61. Pectoral with 10 or 11 rays. Pelvic 6; origin nearer to commencement of anal than base of pectoral. Lower series of photophores consisting of 16 or 17 in front of pectoral, 13 from pectoral to pelvic, 5 from pelvic to origin of anal, and 35–36 (41) from anal to base of caudal; there are about 55 in the upper abdominal series and 43 in the lateral line.

Described from a single specimen, 205 mm. in length; one of the types of the species.

Hab. Indian Ocean.

Apart from a supposed difference in the dentition and some minor differences in the numbers of serial photophores, I am unable to separate the above specimen from Brauer's *T. elongatum*. The palatine and vomerine teeth are very small in this species and were probably overlooked by Brauer.

Genus **Ichthyococcus**, Bonaparte

Bonaparte, 1841, *Icon. F. Ital.* (27), Indice [4] and (138**) [2].
Coccia, Günther, 1864, *Cat. Fish.* v, p. 387.

Apparently related to *Vinciguerria*. Body more or less ovate, compressed. Eyes telescopic; interorbital region very narrow. Mouth small, the lower jaw included and almost completely hidden by the upper jaw; teeth in the jaws minute; vomer and palatines toothless. No pseudobranchiae; gill-openings very wide; gill-rakers rather short, comparatively few in number. Scales present; cycloid. Dorsal 11–12; origin in front of pelvic, the root of which is much nearer to base of caudal than tip of lower jaw. A long, low, adipose fin. Anal 15–17; origin well behind dorsal. Photophores conspicuous, arranged in two series on each side of the abdomen.

A single species.

This aberrant genus appears to be most nearly related to *Vinciguerria*, and the manner in which the photophores develop seems to be the same. Jespersen and Tåning, who have described the marked metamorphosis undergone by *Ichthyococcus*, state that in *Vinciguerria attenuata* (but not in any other species of that genus) the eye is somewhat telescopic in the adolescent stages, but that this character is scarcely apparent in the adult. In the telescopic eyes, narrow interorbital region, etc., *Ichthyococcus* approaches the Sternoptychiidae, but is essentially Gonostomatid in general structure.

Ichthyococcus ovatus (Cocco).

> *Gonostomus ovatus*, Cocco, 1838, *N. Ann. Sci. Nat.* II, p. 169, pl. i, fig. 3.
>
> *Ichthyococcus ovatus*, Bonaparte, 1841, *Icon. F. Ital.* (27), Indice [4] and (138**) [2]; Vaillant, 1888, *Expéd. Sci. 'Travailleur' et 'Talisman', Poissons*, p. 104, pl. xiv, fig. 2; Moreau, 1891, *Hist. Nat. Poiss. France, Suppl.* p. 111; Goode and Bean, 1895, *Ocean. Ichth.* p. 95, fig. 113; Brauer, 1906, *'Valdivia' Tiefsee-Fische*, p. 94, figs. 38–39; Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, XXXV, p. 57; Sanzo, 1913, *Mem. R. Com. Talass. Ital.* XXVII, fig.; Jespersen and Tåning, 1919, *Vid. Medd. Dansk nat. For.* LXX, p. 218; 1926, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 12, p. 38, figs.
>
> *Scopelus ovatus*, Cuvier and Valenciennes, 1849, *Hist. Nat. Poiss.* XXII, p. 453.
>
> *Coccia ovata*, Günther, 1864, *Cat. Fish.* V, p. 388; Carus, 1889–93, *Prodr. F. Medit.* II, p. 568.

Depth of body $2\frac{1}{3}$ to $2\frac{3}{4}$ in the length, length of head nearly 3. Snout shorter than eye, diameter of which is $2\frac{2}{3}$ to 3 in length of head. About 15 gill-rakers on lower part of anterior arch. 36–39 scales in a longitudinal series. Dorsal 11–12; origin about equidistant from end of snout and base of caudal. Anal 15–17. Pectoral with 8 rays. Pelvic with 7 rays. Lower series of photophores consisting of 25 ($7 + 1 + 17$) in front of pelvic, 10 or 11 from pelvic to origin of anal, and 13 or 14 from anal to base of caudal; there are 23–26 photophores in the upper series.

Described from 16 specimens, 25 to 44 mm. in length.

Hab. Mediterranean; Eastern Atlantic; Indian Ocean.

Genus **Maurolicus**, Cocco

> Cocco, 1838, *N. Ann. Sci. Nat.* II, p. 192.
>
> *Triarcus*, Waite, 1910, *Trans. N. Zealand Inst.* XLII (1909), p. 387.

Two species.

Cleft of mouth wide, rather oblique, the lower jaw a little projecting; both jaws with a single series of minute teeth; a single transverse row of similar teeth on the head of the vomer. Pseudobranchiae well developed; gill-openings very wide; gill-rakers long, slender, fairly numerous. Scales present. Photophores large and conspicuous; lower series on body more or less broken up into groups; the series between pelvic and origin of anal separated from that above anterior part of anal. Dorsal 9–12; origin nearer to base of caudal than end of snout. A long, low, adipose fin. Anal 23–27; origin just behind last dorsal ray.

Two species.

Maurolicus muelleri (Gmelin).

Salmo muelleri, Gmelin, 1789, in *Linnaeus*, *Syst. Nat.* ed. 13, I, p. 1378.

Argentina pennantii, Walbaum, 1792, *Artedi Ichth.* ed. 2, III, p. 47.

Scopelus humboldtii (*non* Risso), Yarrell, 1836, *British Fishes*, ed. 1, II, p. 94; 1841, ed. 2, II, p. 161; De Kay, 1842, *Fauna New York*, *Fish.* p. 246, pl. xxxviii, fig. 121.

Scopelus borealis, Nilsson, 1832, *Prodr. Ichth. Skand.* p. 20; Cuvier and Valenciennes, 1849, *Hist. Nat. Poiss.* XXII, p. 438.

Maurolicus amethysto-punctatus, Cocco, 1838, *N. Ann. Sci. Nat.* II, p. 193; Bonaparte, 1841, *Icon. F. Ital.* (27), Indice [4] and (138), fig.; Günther, 1864, *Cat. Fish.* V, p. 390; 1876, *Ann. Mag. Nat. Hist.* (4), XVII, p. 399; 1877, *Trans. N. Zealand. Inst.* IX, p. 472; Moreau, 1881, *Hist. Nat. Poiss. France*, III, p. 509.

Scopelus pennantii, Cuvier and Valenciennes, 1849, *Hist. Nat. Poiss.* XXII, p. 436; Yarrell, 1859, *British Fishes*, ed. 3, I, p. 330, figs.

Scopelus maurolici, Cuvier and Valenciennes, *t.c.* p. 439.

Maurolicus muelleri, Kroyer, 1846–53, *Danmarks Fiske*, III, p. 113, fig.; Smitt, 1895, *Scandinavian Fish.* II, p. 931, pl. xliv, fig. 3; Collett, 1903, *Vid. Selsk. For.* No. 9, p. 111.

Maurolicus borealis, Günther, 1864, *Cat. Fish.* V, p. 389; Jordan and Gilbert, 1882, *Bull. U.S. Nat. Mus.* XVI, p. 284; Goode and Bean, 1895, *Ocean. Ichth.* p. 96, fig. 111; Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, XXXV, p. 58.

Maurolicus pennanti, Day, 1880–84, *Fish. Britain*, II, p. 49, pl. cix, fig. 2; Lilljeborg, 1889, *Sveriges Fiskar*, III (6), p. 10; Lütken, 1892, *Vid. Selsk. Skr.* (6), VII, p. 267; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 577; Holt and Byrne, 1913, *Fisheries, Ireland, Sci. Invest.* 1912, I, p. 16, pl. ii, figs. 1–3; Jespersen and Tåning, 1919, *Vid. Medd. Dansk nat. For.* LXX, p. 220; Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 151; Jespersen and Tåning, 1926, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 12, p. 40, figs.

Maurolicus australis, Hector, 1875, *Trans. N. Zealand Inst.* VII, p. 250, pl. xi.

Maurolicus parvipinnis, Vaillant, 1888, *Miss. Sci. Cap Horn*, 1882–3, VI, *Zool. Poiss.* p. 17, pl. ii, fig. 3.

Gonostoma australis, Hutton, 1876, *Trans. N. Zealand Inst.* VIII, p. 215.

? *Maurolicus borealis*, Holt and Byrne, 1907, *Trans. Linn. Soc. Zool.* X, p. 194, fig. 1.

Triarcus australis, Waite, 1910, *Trans. N. Zealand Inst.* XLII, p. 387, pl. xxxviii.

? *Cyclothone* sp., Fage, 1910, *Ann. Inst. Océan. Monaco*, I (7), p. 7, figs. 3–5.

Maurolicus japonicus, Ischikawa, 1915, *J. Coll. Agric. Tokyo*, VI, p. 183, pls. xii, xiii.

Maurolicus pennanti australis, McCulloch, 1923, *Rec. Austral. Mus.* XIV, p. 114, pl. xiv, fig. 1.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. Young-fish trawl, 250 (–0) m.: 1 specimen, 11 mm.

St. WS 91. 8. iv. 27. 52° 53′ 45″ S, 64° 37′ 30″ W. Commercial otter trawl, 191–205 m.: fine dark sand and shells. 1 specimen, 30 mm.

St. H (Cape trawler). 8. vi. 27. 34° 04′ 00″ S, 17° 36′ 00″ W. Commercial otter trawl, 292–402 m.: 9 specimens, 35–50 mm. Taken from the stomach of *Zeus capensis*.

St. M (Cape trawler). 9. vii. 27. 33° 42′ 00″ S, 17° 29′ 00″ E. Commercial otter trawl, 310–402 m.: 4 specimens, 38–50 mm. Taken from the stomach of *Merluccius*.

Depth of body $3\frac{3}{4}$ to $4\frac{1}{4}$ in the length, length of head 3 to $3\frac{1}{3}$. Snout shorter than eye, diameter of which is $2\frac{2}{5}$ to nearly 3 in length of head and about twice the interorbital width. 25–27 gill-rakers on lower part of the anterior arch. Dorsal 9–12; origin about

equidistant from base of caudal and middle of eye. Anal 23–27; origin just behind last dorsal ray. Pectoral with 17 or 18 rays. Pelvic 7; origin much nearer to base of caudal than tip of lower jaw. Lower series of photophores consisting of 6 on the isthmus, 12 from isthmus to pelvic, 6 (2 + 4) from pelvic to origin of anal, and 1 + 15–18 + 8–9 from anal to base of caudal; there are 9 photophores in the upper row, which ends above the root of the pelvic fin.

Described from many specimens, 20 to 52 mm. in length.

Hab. Atlantic; Mediterranean; Red Sea; Indian Ocean; New Zealand; Japan.

I have carefully tabulated and compared a number of examples from the Mediterranean, Atlantic and New Zealand, but am unable to detect any differences of sufficient importance to warrant the recognition of more than one species. Jespersen and Tåning have noted certain differences in postlarvae from the Mediterranean and Atlantic respectively, but are unable to separate the adults.

Maurolicus oculatus, Garman.

Garman, 1899, *Mem. Mus. Comp. Zool.* XXIV, p. 241, pl. liii, fig. 3.

Perhaps not distinct from the preceding species, but the dorsal fin is said to have only 6 rays, and the number and arrangement of some of the photophores seems to be somewhat different.

Hab. Coast of California.

The length of the type is not stated.

Genus **Argyripnus**, Gilbert and Cramer

Gilbert and Cramer, 1896, *Proc. U.S. Nat. Mus.* XIX, p. 414.

Closely related to *Maurolicus*. Praemaxillary, maxillary and mandible with a single series of sharp, needle-like teeth; one or two small teeth on each side of the vomer and some very small ones on each palatine. Less than 20 gill-rakers on lower part of anterior arch. Series of photophores between pelvic fin and origin of anal continuous with that above the anterior part of the anal. Origin of dorsal nearer to end of snout than base of caudal.

One or two species.

Argyripnus iridescens, McCulloch.

McCulloch, 1926, *Biol. Res. 'Endeavour'*, v, p. 169, pl. xlv, fig. 2.

Depth of body nearly $3\frac{1}{2}$ in the length, length of head $3\frac{1}{4}$ to $3\frac{1}{2}$. Snout shorter than eye, diameter of which is about $3\frac{1}{2}$ in length of head and much greater than interorbital width. About 16 gill-rakers on lower part of anterior arch. Dorsal 12 (12–14). Anal 24–25; origin below last rays of dorsal. Pectoral with 16 rays. Pelvic 7; origin nearer to tip of lower jaw than base of caudal. Lower series of photophores consisting of 6 on the isthmus, 10 from isthmus to pelvic, 20–21 from pelvic to above anterior part of anal, 5 above middle of anal, and 13 from above last anal rays to base of caudal; there are 7 photophores in the upper series.

Described from two specimens, 98 and 100 mm. in length; paratypes of the species received in exchange from the Australian Museum.

Hab. Great Australian Bight.

Argyripnus ephippiatus, Gilbert and Cramer.

Gilbert and Cramer, 1896, *Proc. U.S. Nat. Mus.* XIX, p. 414, pl. xxxix, fig. 2.

Probably not distinct from the above, but the dorsal is said to have only 10 rays and the anal 22. There are 19 photophores in the series from the pelvic to above anterior part of anal, and 15 from last anal rays to base of caudal.

Hab. Hawaiian Islands.

Known from a single example in bad condition, about 90 mm. in length.

Genus **Valenciennellus**, Goode and Bean

Valenciennellus (Jordan and Evermann), Goode and Bean, 1895, *Ocean. Ichth.* p. 513; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 577.

Close to *Maurolicus*. Dorsal 7–8; origin opposite to that of the anal. Anal 23–25. The photophores above and behind the anal fin are arranged in four or five groups, each of which is on a black background.

A single species.

Valenciennellus tripunctulatus (Esmark).

Maurolicus tripunctulatus, Esmark, 1871, *Vid. Selsk. Forh. Christiania* (1870), p. 489; Lütken, 1892, *Vid. Selsk. Skr.* (6), VII, p. 269, pl. i, fig. 6.

Valenciennellus tripunctulatus, Goode and Bean, 1895, *Ocean. Ichth*, p. 513; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 577; Weber, 1913, '*Siboga*' *Fische*, p. 20; Weber and Beaufort, 1913, *Fish. Indo-Austral. Arch.* II, p. 136, fig. 50; Pappenheim, 1914, *Deutsche Süd-polar-Exped.* XV, *Zool.* VII, p. 182; Pietschmann, 1914, *SitzBer. K. Akad. Wiss. Wien*, CXXIII (1), p. 427, pl. ii, figs. 4–5.

? *Valenciennellus stellatus*, Garman, 1899, *Mem. Mus. Comp. Zool.* XXIV, p. 239, pl. liii, fig. 2; Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 100, fig. 42.

? *Cyclothone* sp. Fage, 1910, *Ann. Inst. Océan. Monaco*, I (7), p. 7, figs. 3–5.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 1 specimen, 24 mm.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. Young-fish trawl, 150 (–0) m.: 3 specimens, 14–19 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. $4\frac{1}{2}$ m. net, horizontal, 125–175 (–0) m.: 1 specimen, 25 mm.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 1 specimen, 24 mm.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 6 specimens, 20–23 mm.

Depth of body about $3\frac{2}{3}$ in the length, length of head $3\frac{3}{4}$. Snout shorter than eye, diameter of which is about $2\frac{1}{2}$ in length of head. Dorsal 7–8; origin about equidistant from end of snout and base of caudal. Anal 23–25. Pectoral with 12 rays. Pelvic with 8 (?) rays.

Described from 10 specimens, the largest 25 mm. in length.

Hab. Between Greenland and Iceland; Atlantic; Madagascar; Indian Ocean; Timor Sea; coast of California.

Family STERNOPTYCHIIDAE

Genus **Argyropelecus**, Cocco, 1829

Synopsis of the Species of Argyropelecus

I. Photophores forming a nearly continuous series.

A. Depth of body (without dorsal ridge) $2\frac{1}{4}$ to $2\frac{1}{3}$ in the length; praedorsal ridge rather low, length of exposed portion of last spine more than twice in the base of the dorsal fin. 1. *affinis*, Garman, 1899

B. Depth of body (without dorsal ridge) $1\frac{4}{5}$ to nearly 2 in the length; praedorsal ridge higher, length of exposed portion of last spine $1\frac{3}{5}$ to $1\frac{2}{3}$ in the base of the dorsal fin. 2. *gigas*, n.sp.

II. Postabdominal photophores in three groups (prae-anal, supra-anal, and caudal).

A. A single serrated abdominal spine; supra-anal photophores separated from prae-anals by a distance of more than half the length of the supra-anal series, and from the caudal by a distance which is greater than the length of the supra-anal series. 3. *hemigymnus*, Cocco, 1829

B. A pair of smooth abdominal spines; supra-anal photophores separated from the prae-anals by a very short interspace, and from the caudals by a distance which is less than the length of the supra-anal series.

1. Posterior abdominal spine longer than the anterior and directed backwards; adults with the dorsal and abdominal ridges serrated, and with a double series of spines on the lower edge of the caudal peduncle. 4. *aculeatus*, Cuv. and Val., 1850

2. Abdominal spines subequal or anterior the longer; dorsal and abdominal ridges not serrated; no spines on the caudal peduncle.

a. Lower praeopercular spine curved, the upper very small or absent; depth of body about $1\frac{1}{2}$ in the length. 5. *olfersii* (Cuvier, 1829)

b. Lower praeopercular spine straight, the upper of moderate size or rather small, directed backwards; depth of body $1\frac{3}{5}$ or more in the length. 6. *sladeni*, Regan, 1908

Argyropelecus elongatus, Esmark [1871, *Forh. Vid. Selsk. Christiania* (1870), p. 489], is too briefly described to be identified with certainty, but may be synonymous with *A. affinis*. *A. bocagei*, Osorio [1909, *Mem. Mus. Bocage*, 1, p. 27, pl. ii, fig. 3], is also unrecognisable.

Argyropelecus affinis, Garman.

Argyropelecus hemigymnus (*non* Cocco), Goode and Bean, 1895, *Ocean. Ichth.* pl. xxxix, fig. 147.

Argyropelecus affinis, Garman, 1899, *Mem. Mus. Comp. Zool.* xxiv, p. 237; Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 103, pl. vii, figs. 1–2; Regan, 1908, *Trans. Linn. Soc. Zool.* xii, p. 218; Jespersen and Tåning, 1915, *Rep. Danish Ocean. Exped.* 1908–10, ii, A, 2, p. 6; Barnard, 1925, *Ann. S. Afric. Mus.* xxi, p. 152, pl. viii, fig. 1.

St. 296. 26. viii. 27. 8° 12′ 00″ N, 18° 49′ 00″ W. Young-fish trawl, 450–500 (–0) m.: 2 specimens, 43–55 mm.

Hab. Atlantic; Caribbean Sea; Indian Ocean.

Argyropelecus gigas, n.sp.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 650 (–0) m.: 1 specimen, 44 mm.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 1 specimen, 87 mm. Holotype.

11. ii. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 1 specimen, 82 mm.

Related to *A. affinis*. Depth of body $1\frac{4}{5}$ to nearly twice in the length, length of head $3\frac{1}{2}$ to $3\frac{3}{4}$. Praeoperculum with a strong, straight or slightly curved, downwardly directed spine at the angle, above which is a much smaller spine directed outwards. No very

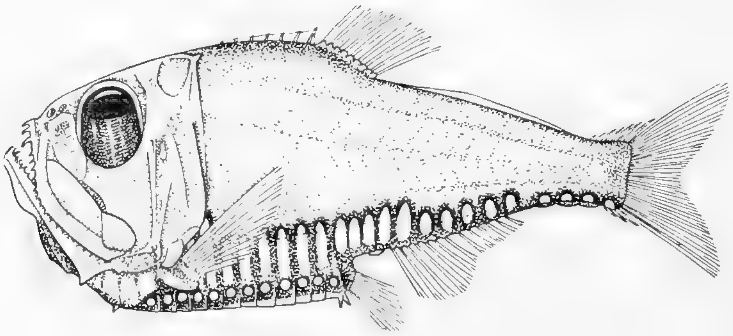

Fig. 9. *Argyropelecus affinis*. (× $1\frac{1}{2}$.)

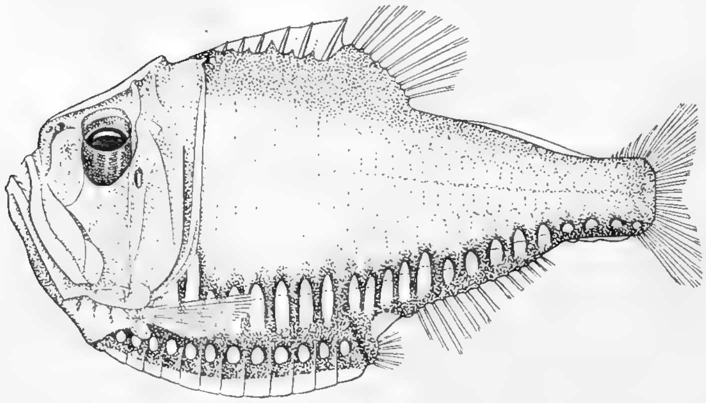

Fig. 10. *Argyropelecus gigas*. Holotype. (× 1.)

long teeth in the lower jaw; palatines toothless or with a few feeble teeth anteriorly. Eleven gill-rakers on lower part of anterior arch. Praedorsal ridge rather high, length of exposed portion of last spine $1\frac{3}{5}$ to $1\frac{2}{3}$ in base of dorsal fin. Arrangement of photophores similar to that of *A. affinis*. Dorsal 9. Anal 13.

Described from 3 specimens, 44 to 87 mm. in length, of which the largest is selected as the holotype.

Hab. Atlantic.

In addition to the characters mentioned in the synopsis above, this species may be readily distinguished from *A. affinis* by the form of the spine at the angle of the praeoperculum.

Argyropelecus hemigymnus, Cocco.[1] [Pl. II, fig. 4.]

Cocco, 1829, *Giorn. Sc. Sicil.*, fasc. 77, p. 146; Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 106, fig. 45; Regan, 1908, *Trans. Linn. Soc. Zool.* XII, p. 219; Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, XXXV, p. 51; Holt and Byrne, 1913, *Fisheries, Ireland, Sci. Invest.* 1912, I, p. 21, figs. 7 *b* and 8; Pappenheim, 1914, *Deutsche Südpolar-Exped.* XV, *Zool.* VII, p. 182; Jespersen, 1915, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 2, p. 7; Roule, 1919, *Rés. Camp. Sci. Monaco*, LII, p. 25; Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 153; Jespersen and Tåning, 1926, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 12, p. 48.

Sternoptyx mediterranea, Cocco, 1838, *Oss. pesci Messina* (*Il Faro*, IV), p. 7.

? *Argyropelecus d'urvillei*, Cuvier and Valenciennes, 1850, *Hist. Nat. Poiss.* XXII, p. 405.

? *Argyropelecus intermedius*, Clarke, 1878, *Trans. Proc. N. Zealand Inst.* X, p. 244, pl. vi.

? *Argyropelecus heathi*, Gilbert, 1905, *Bull. U.S. Fish. Comm.* XXIII (1903), p. 601, pl. lxxii, fig. 1.

The 'Discovery' obtained 57 examples of this species from the following stations in the South Atlantic, at depths ranging from 0–2500 m., measuring from 9 to 34 mm. in length: St. 3, 81, 83, 85, 86, 87, 89, 100, 257, 258, 267.

Hab. Mediterranean; Atlantic; Indian Ocean; Hawaiian Islands (?); New Zealand (?).

Argyropelecus aculeatus, Cuvier and Valenciennes.

Cuvier and Valenciennes, 1850, *Hist. Nat. Poiss.* XXII, p. 406; Günther, 1864, *Cat. Fish.* V, p. 386; Sauvage, 1891, *Hist. Madagascar*, XVI, *Poissons*, p. 483, pl. xlviii, fig. 5; Lütken, 1892, *Vid. Selsk. Skr.* (6), VII, p. 282; Goode and Bean, 1895, *Ocean. Ichth.* p. 127; Collett, 1903, *Christiania Vid. Selsk. For.* No. 9, p. 108; Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 110, fig. 47; Murray and Hjort, 1912, *Depths of the Ocean*, p. 612; Jespersen, 1915, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 2, p. 27.

Sternoptyx acanthurus, Cuvier and Valenciennes, 1850, *Hist. Nat. Poiss.* XXII, p. 408.

Sternoptychides amabilis, Ogilby, 1888, *Proc. Linn. Soc. N.S. Wales* (2), III, p. 1313.

? *Argyropelecus caninus*, Garman, 1899, *Mem. Mus. Comp. Zool.* XXIV, p. 235.

Argyropelecus amabilis, McCulloch, 1923, *Rec. Austral. Mus.* XIV, p. 118, pl. xiv, fig. 3.

St. 89. 28. vi. 26. 34° 05′ 15″ S, 16° 00′ 45″ E. Young-fish trawl, 1000 (–0) m.: 5 specimens, 9–55 mm.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. Young-fish trawl, 250 (–0) m.: 2 specimens, 15–25 mm.

St. 259. 26. vi. 27. 34° 59′ 00″ S, 16° 39′ 00″ E. Young-fish trawl, 370–450 (–0) m.: 2 specimens, 14–19 mm.

Hab. Atlantic; Indian Ocean.

The adults of this species may be readily distinguished from those of *A. olfersii* by the serration of the dorsal and abdominal ridges, and by the double series of spines on the lower surface of the caudal peduncle. Neither of these characters is apparent in young or half-grown examples, which may be recognised, however, by the shape of the body and the form of the abdominal spine.

[1] For full synonymy of this species see Brauer (1906)

Argyropelecus olfersii (Cuvier).[1]

Sternoptyx olfersii, Cuvier, 1829, *R. Anim.* ed. 2, II, p. 316.

Argyropelecus olfersii, Cuvier and Valenciennes, 1850, *Hist. Nat. Poiss.* XXII, p. 408; Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 108, fig. 46; Regan, 1908, *Trans. Linn. Soc. Zool.* XII, p. 219; Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, XXXV, p. 52; Holt and Byrne, 1913, *Fisheries, Ireland, Sci. Invest.* 1912, I, p. 20, fig. 7 *a*; Weber and Beaufort, 1913, *Fish. Indo-Austral. Arch.* II, p. 134, fig. 49; Jespersen, 1915, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 2, p. 23; Roule, 1919, *Rés. Camp. Sci. Monaco*, LII, p. 25; Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 153.

Pleurothyris olfersi, Lowe, 1843, *Hist. Fish. Madeira*, p. 64.

? *Argyropelecus lychnus*, Garman, 1899, *Mem. Mus. Comp. Zool.* XXIV, p. 234, pl. J, fig. 1.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850–950 (–0) m.: 1 specimen, 22 mm. ?

Hab. Atlantic; Indian Ocean; Pacific coast of Central America (?).

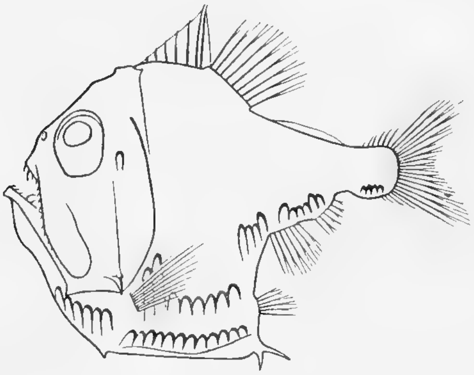

Fig. 11. *Argyropelecus aculeatus.*
Young example. (× 2½.)

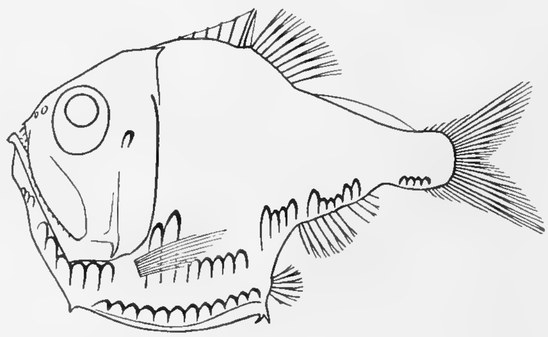

Fig. 12. *Argyropelecus olfersii.*
Young example. (× 2.)

Argyropelecus sladeni, Regan.

Regan, 1908, *Trans. Linn. Soc. Zool.* XII, p. 218. Falkland I.

St. 170. 23. ii. 27. Off Cape Bowles, Clarence Island, 61° 25′ 30″ S, 53° 46′ 00″ W. Young-fish trawl, 200 (–0) m.: 1 specimen, 26 mm.

St. 269. 26. vii. 27. 15° 55′ 00″ S, 10° 35′ 00″ E. 4½ m. net, horizontal, 600–700 (–0) m.: 3 specimens, 23–28 mm.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. Young-fish trawl, 150 (–0) m.: 1 specimen, 25 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. 4½ m. net, horizontal, 125–175 (–0) m.: 32 specimens, 8–27 mm.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 7 specimens, 14–25 mm.

St. 297. 28. viii. 27. 12° 08′ 00″ N, 20° 53′ 30″ W. Young-fish trawl, 200–300 (–0) m.: 1 specimen, 15 mm.

The young and half-grown specimens of this species are often difficult to distinguish from those of *A. olfersii*. If specimens of equal size are compared, however, it will be

[1] For full synonymy of this species see Brauer (1906). Some of the references may refer to *A. sladeni*.

observed that the body is deeper in *A. olfersii* and the angle of the body behind the abdominal spines more marked. The lower praeopercular spine is more or less straight in *A. sladeni*, the small upper spine being well developed and directed outwards and backwards; in *A. olfersii* the lower spine is always more or less curved, and the upper spine is very small in young examples and minute or absent altogether in the adults.

Hab. North and South Atlantic; Antarctic; Indian Ocean.

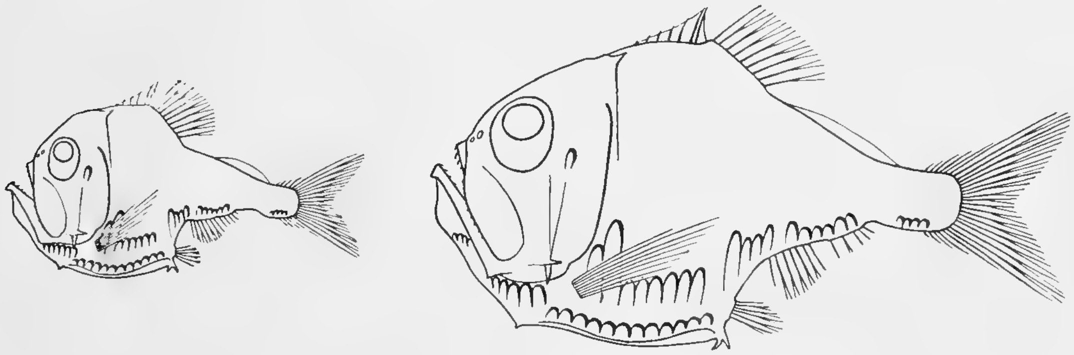

Fig. 13. *Argyropelecus sladeni.* Young and adult examples. (× 2½.)

Sternoptyx diaphana, Hermann, 1781.

Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 115, figs. 56–63.
? *Sternoptyx obscura*, Garman, 1899, *Mem. Mus. Comp. Zool.* XXIV, p. 232, pl. liii, fig. 1.

The 'Discovery' obtained 84 specimens of this species from the following stations in the North and South Atlantic, at depths ranging from 0–2700 m., measuring from 6 to 60 mm. in length: St. 78, 81, 85, 86, 87, 101, 256, 269, 281, 285, 287, 288, 295.

Hab. Atlantic; Indo-Pacific.

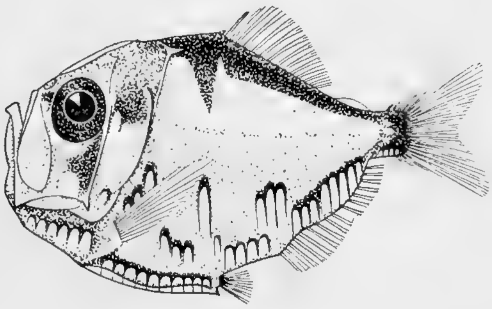

Fig. 14. *Polyipnus laternatus.* (× 1½.)

Polyipnus laternatus, Garman.

Garman, 1899, *Mem. Mus. Comp. Zool.* XXIV, p. 238.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. Young-fish trawl, 150 (–0) m.: 3 specimens, 12–14 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 11 specimens, 18–34 mm.

Hab. Atlantic; West Indies.

Distinguished from *P. spinosus*, Günther, 1887, by the form of the post-temporal spines, the presence of palatine teeth, and the arrangement of the postabdominal photophores.

Family ASTRONESTHIDAE

A monograph of this family has been quite recently published by Regan and Trewavas (1929, *Ocean. Rep. Danish 'Dana'-Exped.* (1920–2), v, pp. 12–30, pls. i–vi, text-figs.), based largely on the material obtained by the 'Dana' in the Atlantic, Caribbean Sea, and Gulf of Panama.

Astronesthes filifer, Regan and Trewavas.

Regan and Trewavas, 1929, *t.c.* p. 14, pl. i, fig. 1

St. 294. 25. viii. 27. 4° 33′ 15″ N, 16° 52′ 45″ W. 1 m. tow-net, oblique, 84 (–0) m.: 1 specimen, 28 mm. 70 cm. tow-net, oblique, 84 (–0) m.: 1 specimen, 29 mm. Young-fish trawl, 100–150 (–0) m.: 2 specimens, 28–31 mm.

Hab. North Atlantic; Caribbean Sea.

Astronesthes cyaneus (Brauer, 1902).

Regan and Trewavas, *t.c.* p. 21, fig. 14.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 1 specimen, 42 mm.

Hab. Atlantic; Caribbean Sea; Indian Ocean.

Astronesthes indicus, Brauer, 1902.

Regan and Trewavas, *t.c.* p. 23, pl. ii, fig. 3.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 1 specimen, 85 mm.

Hab. Atlantic; Caribbean Sea; Indian Ocean.

Borostomias antarcticus (Lönnberg).

Astronesthes antarcticus, Lönnberg, 1905, *Zool. Anz.* XXVIII, p. 762.
Astronectes antarcticus, Lönnberg, 1905, *Wiss. Ergebn. Schwed. Südpolar-Exped.* v (6), p. 65.
Borostomias antarcticus, Regan and Trewavas, *t.c.* p. 25.

St. 114. 12. xi. 26. 52° 55′ 00″ S, 9° 50′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 650–700 m.: 1 specimen, 180 mm.

Depth of body $6\frac{1}{4}$ in the length, length of head $5\frac{1}{5}$. Snout a little longer than eye, diameter of which is $5\frac{2}{3}$ in length of head. Postocular luminous organ much smaller than eye, apparently single, and with a slight anterior prolongation below the eye. Barbel $1\frac{1}{2}$ times as long as head; unpigmented stem[1] followed by a swollen black part, which is followed by a hyaline area with a small luminous body on either side and a short filamentous process; barbel ending in a globular white bulb. Maxillary with 6 or 7 teeth. Dorsal 12; origin just behind pelvics. Anal 15. Pelvics 7-rayed, about equidistant from end of snout and base of caudal. Photophores—in ventral series I–P 10; P–V 25; V–A 22 or 23; A–C 12: in lateral series O–V 23; V–A 22.

[1] The skin may have been stripped off.

Described from a single specimen, 180 mm. in length.

Hab. South Atlantic.

In the form of the teeth on the maxillary this species is a typical *Borostomias*, but in the anterior prolongation of the postocular luminous organ and in the structure of the barbel it is very similar to some of the species placed in the genus *Diplolychnus* by Regan and Trewavas. The single specimen is unfortunately poorly preserved, and it is impossible to be certain as to the form of the postocular luminous organ.

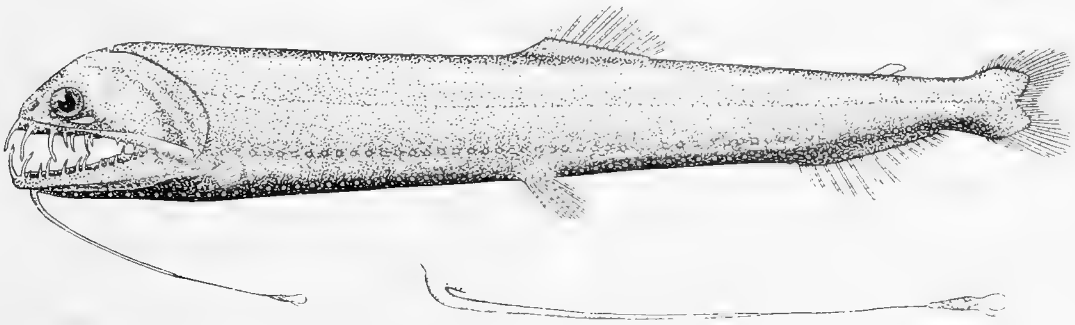

Fig. 15. *Borostomias antarcticus.* (× $\frac{3}{4}$.) [Barbel × $1\frac{1}{2}$.]

Neonesthes microcephalus, n.sp.

St. 269. 26. vii. 27. 15° 55′ 00″ S, 10° 35′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 600–700 (–0) m.: 2 specimens, 145–148 mm.

Depth of body nearly 7 in the length, length of head $6\frac{1}{3}$. Snout short; diameter of eye 4 in length of head. Postocular luminous body 3 to 4 in length of head, with a narrow subocular prolongation more or less covered by a pigment layer. Barbel $1\frac{1}{10}$ to

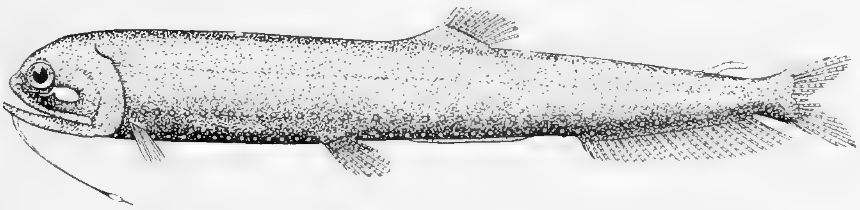

Fig. 16. *Neonesthes microcephalus.* Holotype. (× $\frac{3}{4}$.)

$2\frac{1}{3}$ times as long as head; in the specimen with the shorter barbel the hyaline stem ends in a swollen white bulb which is prolonged distally into a fine filament, and there is a collar of pigmented tissue round the base of the bulb; in the other specimen the hyaline stem ends in a slightly swollen white tip, which is somewhat damaged but appears to be without pigmented collar or filament. Dorsal 10, short, above interspace between pelvics and anal. Anal 22 or 23. Pectorals 8. Pelvics 7-rayed, considerably nearer to snout than to caudal. Traces of a ventral adipose fin. Photophores—in ventral series I–P 9–10; P–V 16–17; V–A 18–19; A–C 12 (?): in lateral series O–V 14 (?); V–A 18 (?).

Described from two specimens, 145 and 148 mm. in length, of which the smaller is selected as the holotype.

Hab. South Atlantic.

Close to *N. macrolychnus*, Regan and Trewavas, from the North Atlantic, differing in the smaller head and mouth, structure of the barbel, and in the smaller number of anal rays. The length and form of the barbel appears to be very different in the two specimens described above, but I am unable to detect any other differences.

Neonesthes macrolychnus, Regan and Trewavas.

Regan and Trewavas, 1929, *t.c.* p. 30, pl. vi, fig. 2.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. 4½ m. net, horizontal, 650 (–0) m.: 1 specimen, 65 mm.

Hab. North and South Atlantic.

Family CHAULIODONTIDAE

Chauliodus sloanei, Schneider, 1801.

Regan and Trewavas, 1929, *Ocean. Rep. Danish 'Dana'-Exped.* (1920–2), v, p. 32, fig. 24.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 3 specimens, 33–190 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net, horizontal, 850–950 m.: 3 specimens, 195–230 mm. 4½ m. net, horizontal, 350–400 (–0) m.: 1 specimen, 190 mm.

St. 282. 12. viii. 27. 1° 11′ 00″ S, 5° 38′ 00″ E. Young-fish trawl, 300 (–0) m.: 3 specimens, 30–70 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. 4½ m. net, horizontal, 125–175 (–0) m.: 1 specimen, 60 mm.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 1 specimen, 235 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 7 specimens, 95–180 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 1 specimen, 175 mm.

Hab. Mediterranean; Atlantic; Caribbean Sea; Japan; Australia (?).

Chauliodus danae, Regan and Trewavas.

Regan and Trewavas, 1929, *t.c.* p. 34, pl. vii.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. 4½ m. net, horizontal, 650 (–0) m.: 5 specimens, 45–100 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 1 specimen, 145 mm.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 1 specimen, 55 mm.

Hab. Atlantic; Caribbean Sea; Indian Ocean; New Guinea.

Family STOMIATIDAE

A monograph of this family has been recently published by Regan and Trewavas (1930, *Ocean. Rep. Danish 'Dana'-Exped.* (1920–2), VI, pp. 53–133, pls. i–xi, text-figs.), based largely on material obtained by the 'Dana' in the Atlantic, Caribbean Sea, and Gulf of Panama. Through the kindness of the authors I have been able to refer to their manuscript during the preparation of this report.

Genus **Odontostomias**, gen. nov.

Elongate; head short. Cleft of mouth straight; jaws rather strong. Teeth tapering to sharp ends; first tooth in upper jaw rather small, fixed; second long, depressible, followed by 2 or 3 outer small fixed teeth and 1 inner stronger depressible tooth; lower jaw with a pair of small depressible teeth at the symphysis, a strong fixed fang on either side, followed by an inner depressible tooth and 3 or 4 outer fixed teeth; maxillary teeth all small, more or less erect; two groups, each of 1 to 4 teeth, on the vomer; 2 to 5 teeth on each palatine; a single pair of teeth on basibranchials or none. Teeth on gill-arches in pairs. Postocular luminous organ well developed (♂ ?) or absent (♀ ?). Dorsal 20–23. Anal 23–26; origin nearly below that of dorsal. Pectoral 7–9, without isolated ray. Pelvics 7-rayed, well behind middle of length.

Two species. Genotype: *Odontostomias micropogon*, n.sp.

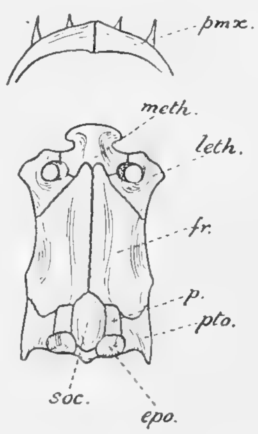

Fig. 17. Upper view of skull of *Odontostomias micropogon*. (× 2.) *epo.* epiotic; *fr.* frontal; *leth.* lateral ethmoid; *meth.* mesethmoid; *p.* parietal; *pmx.* praemaxillary; *pto.* pterotic; *soc.* supra-occipital.

Examination of the skulls of the fishes of this genus shows that it belongs to the group containing *Opostomias*, *Flagellostomias*, *Thysanactis* and *Leptostomias*, distinguished by the absence of post-temporals and the presence of parietals. In the form of the ethmoid region this genus seems to be nearest to *Opostomias*, but differs in having no isolated pectoral ray, and in the fangs of the lower jaw not perforating the praemaxillaries when the mouth is closed. The structure of the anterior part of the praemaxillaries bears some resemblance to that found in *Thysanactis*, but the median process is much less developed and the lateral projections are narrower.

Odontostomias micropogon, n.sp.

St. 269. 26. vii. 27. 15° 55′ 00″ S, 10° 35′ 00″ E. 4½ m. net, horizontal, 600–700 (–0) m.: 2 specimens, 180–186 mm.

St. 270. 27. vii. 27. 13° 58′ 30″ S, 11° 43′ 30″ E. Young-fish trawl, 200 (–0) m.: 8 specimens, 40–52 mm.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. 1 m. tow-net, oblique, 110 (–0) m.: 3 specimens, 38–45 mm. Young-fish trawl, 150 (–0) m.: 10 specimens, 39–290 mm. (The largest specimen is selected as the holotype.)

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 1 specimen, 90 mm.

Depth of body 8½ (young) to 12½ in the length, length of head 7 to 8⅔. Diameter of eye 4¼ to 6 in length of head, a little greater than postocular luminous organ.[1] Barbel ¼ to ⅔ length of head; stem black, terminating in a simple white portion, scarcely

[1] The postocular luminous organ is well developed in some examples, and is altogether wanting in others. I have been able to determine the sex of two individuals, and find that the one with an organ is a male and the one without a female.

broader than the stem in adults, but forming a more or less definite bulb in the young. Five fixed teeth in lower jaw. A pair of teeth on basibranchials. Dorsal 20–23. Anal 23–26. Pectoral 7–9. Pelvic 7. Photophores—in ventral series I–P 10–11; P–V 34–36; V–A 13–15; A–C 12–13: in lateral series O–V 32–35; V–A 12–14.

Described from 24 specimens, 38 to 290 mm. in length.

Hab. North and South Atlantic.

Fig. 18. *Odontostomias micropogon.* Holotype. (× ½.)

Odontostomias masticopogon, n.sp.

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 1 specimen, 290 mm.

Depth of body nearly 10 in the length, length of head 7¾. Diameter of eye about 6 in length of head. No postocular luminous organ. Barbel 1⅓ times length of fish; bulb (and possibly part of stem) apparently broken off. Four fixed teeth in lower jaw. No teeth on basibranchials. Dorsal 23. Anal 26 (or 27). Pectoral 9. Pelvic 7. Photophores —in ventral series I–P 10; P–V 36; V–A 14; A–C ?: in lateral series O–V 35; V–A 15.

Described from a single specimen, 290 mm. in length; holotype of the species.

Hab. North Atlantic.

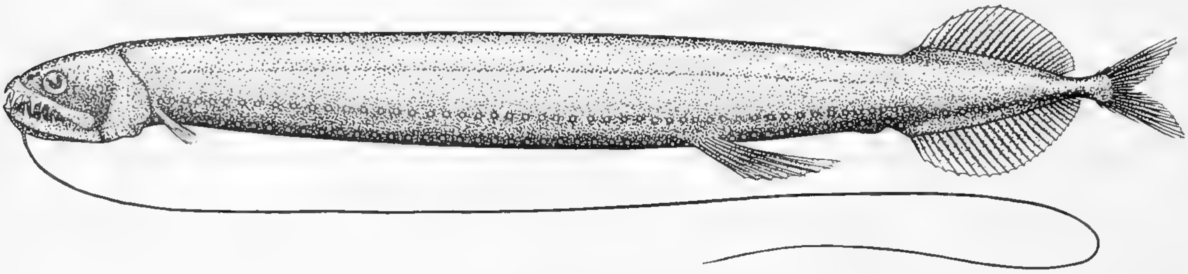

Fig. 19. *Odontostomias masticopogon.* Holotype. (× ½.)

Flagellostomias boureei (Zugmayer, 1913).

Regan and Trewavas, *t.c.* p. 57, pl. ii, fig. 2, text-fig. 33.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. 4½ m. net, horizontal, 650 (–0) m.: 1 specimen, 60 mm.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. Young-fish trawl, 150 (–0) m.: 1 specimen, 85 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 2 specimens, 70–80 mm.

Hab. Atlantic; West Indies.

Leptostomias macropogon, n.sp.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. 1 m. tow-net, horizontal, 55 m.: 1 specimen, 65 mm.

Depth of body about 16 in the length, length of head 10. Diameter of eye $4\frac{1}{2}$ in length of head. Maxillary with oblique teeth, the first 2 or 3 larger and nearly erect. Barbel nearly $\frac{3}{4}$ length of fish; proximal part of stem black, distal part with white spots and patches, which become larger nearer the bulb and finally unite to cover the black part completely; no filaments or appendages, except just proximal to bulb; bulb about $\frac{3}{5}$ length of head, slightly curved, narrow at tip; a series of 4 very small filaments on distal part of stem and proximal half of convex side of bulb; two pairs of similar filaments on distal part of bulb, and between these another filament, to which is attached a minute bulb at the end of a very fine stem. Dorsal 20. Anal 25. Pectoral 10. Pelvic 7. Photophores—in ventral series I–P 10; P–V 47; V–A 22; A–C 11: in lateral series O–V 45; V–A 22.

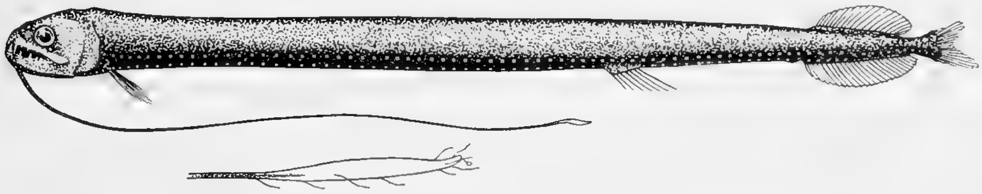

Fig. 20. *Leptostomias macropogon*. Holotype. (× $\frac{3}{4}$.) [Barbel × 3.]

Described from a single specimen, 165 mm. in length; holotype of the species.

Hab. South Atlantic.

This species may eventually prove to be identical with *L. gracilis*, Regan and Trewavas, described from four specimens, 70 to 75 mm. in length, but appears to differ in the length of the barbel and the structure of the bulb. In a related species, *L. ramosus*, the length of the barbel is less than $\frac{1}{3}$ that of the fish in an example 56 mm. in length, and nearly $\frac{1}{2}$ in one of 180 mm. In *L. leptobolus* it is $\frac{3}{5}$ in a specimen of 65 mm. and nearly $\frac{3}{4}$ in one of 95 mm. In *Flagellostomias boureei* the length of the barbel varies from $\frac{1}{3}$ to $\frac{2}{3}$ that of the fish in specimens measuring from 39 to 322 mm. in length. Assuming that the barbel grows at much the same rate in all these species, one would expect it to be about $\frac{1}{2}$ the length of the fish in a specimen of *L. gracilis* of 165 mm., whereas in that described above it is nearly $\frac{3}{4}$. *L. macropogon* may be distinguished from *L. haplocaulus* by the form of the bulb and the greater number of P–V photophores, and from *L. longibarba* by the structure of the bulb.

Bathophilus irregularis, n.sp.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 650 (–0) m.: 1 specimen, 40 mm.

Depth of body about $6\frac{1}{3}$ in the length, length of head a little more than 4. Postocular organ large; a small white spot below its anterior part. Dorsal 12 (or 13). Anal 16. Pectoral 3 + 7. Pelvics 21-rayed; inserted at middle of side, a little nearer to base of

caudal than end of snout. Photophores in ventral series consisting of 5 in front of the pectoral fin, 4 very small ones close together immediately behind the pectoral, 2 close together a little before pelvic and 1 or 2 very small ones just behind that fin, 4 close together above vent, and 5 behind anal. In the lateral series O–V 10 + 3, forming an ascending row, the last three being on the back; V–A 11, forming a curved row running from level of pelvic fin upwards nearly to back and then down again to the same level.

Described from a single specimen, 40 mm. in length; holotype of the species.

Hab. South Atlantic.

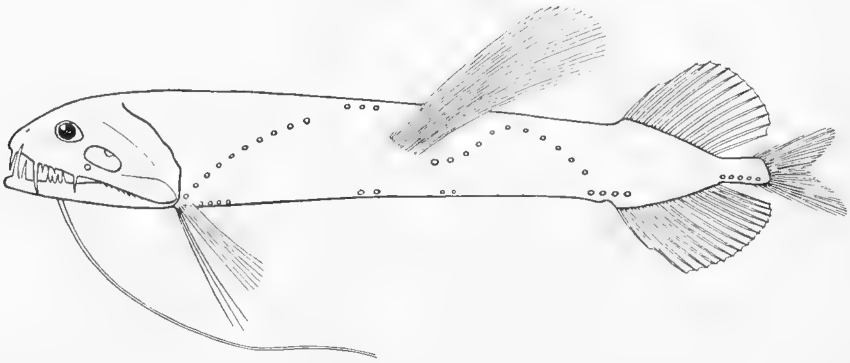

Fig. 21. *Bathophilus irregularis.* Holotype. (× $2\frac{1}{2}$.)

This species seems to be most nearly related to *B. longipes* and *B. schizochirus*, Regan and Trewavas; it is readily distinguished from the former by the number of pelvic rays, and from the latter by the number of pectoral rays and larger postocular luminous organ, and from all other species of the genus by the peculiar arrangement of the lateral photophores.

Bathophilus longipinnis (Pappenheim, 1914).

Regan and Trewavas, *t.c.* p. 68, pl. v, fig. 1.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 650 (–0) m.: 1 specimen, 102 mm.

Hab. Atlantic; Caribbean Sea.

Bathophilus pawneei, Parr, 1927.

Regan and Trewavas, *t.c.* p. 69, fig. 47.

St. 280. 10. viii. 27. 00° 36′ 00″ S, 8° 28′ 00″ E. Young-fish trawl, 200–100 (–0) m.: 5 specimens, 55–62 mm.

St. 286. 17. viii. 27. 3° 06′ 30″ S, 3° 53′ 00″ W. Young-fish trawl, 125 (–0) m.: 1 specimen, 47 mm.

Hab. Atlantic; Caribbean Sea.

Eustomias (Haploclonus) regani, n.sp.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. 1 m. tow-net, oblique, 73–0 m.: 1 specimen, 58 mm.

Depth of body $11\frac{1}{2}$ in the length, length of head about 8. Diameter of eye $5\frac{1}{2}$ in length of head, interorbital width about 5. Barbel $\frac{1}{4}$ length of fish; bulb small, oval, with

terminal filaments arranged as shown in the accompanying figure; long filament with a luminous swelling at the tip. Dorsal 22 (?). Anal 38. Pectoral 3. Pelvic 7. Photophores—in ventral series I–P 7; P–V 26; V–A 12; A–C 19: in lateral series O–V 26; V–A 12.

Described from a single specimen, 58 mm. in length; holotype of the species.

Hab. Atlantic.

Apparently related to *E. enbarbatus*, Welsh, differing chiefly in the form of the barbel. Named for Dr C. Tate Regan, F.R.S., in recognition of his work on the 'Dana' Stomiatoids.

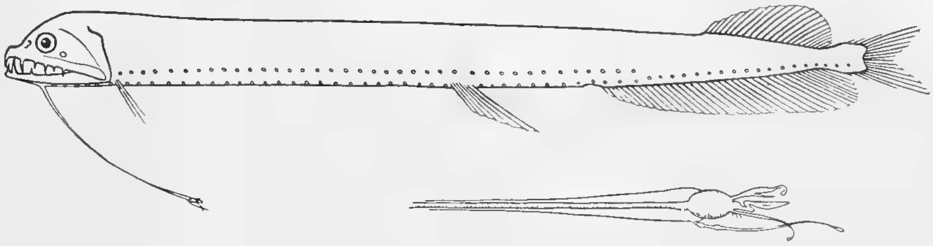

Fig. 22. *Eustomias (Haploclonus) regani.* Holotype. (× 2.) [Barbel × 6.]

Eustomias (Eustomias) obscurus, Vaillant, 1888.

Regan and Trewavas, *t.c.* p. 81, pl. vii, fig. 4, text-figs. 58–60.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 1 specimen, 156 mm.

Hab. Atlantic.

According to the label the basal half of the proximal swelling of the barbel was coloured pink in life, the apical half and the distal swelling being cream coloured.

Eustomias (Nominostomias) trewavasae, n.sp.

St. 79. 13. vi. 26. 34° 48′ 00″ S, 16° 36′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 1 specimen, 60 mm.

Depth of body 12 in the length, length of head (with snout produced) about 8. Diameter of eye about 5 in length of head. Barbel more than $\frac{1}{3}$ length of fish; 3 bulbs, the middle one close to and somewhat larger than the distal one, which bears a knob-like process at its extremity but no filaments; a small luminous swelling on the stem at some distance from the proximal bulb; a bunch of about 6 filaments, deeply pigmented at the base comes off from the stem just distal to the first bulb. Dorsal 23 (?). Anal 35 (?). Pectoral 3. Pelvic 7. Photophores—in ventral series I–P 7; P–V 32; V–A 16; A–C 15: in lateral series O–V 32; V–A 16.

Described from a single specimen, 60 mm. in length; holotype of the species.

Hab. South Atlantic.

This species appears to be rather close to *E. variabilis*, Regan and Trewavas, and *E. trituberatus*, Regan and Trewavas, differing from both chiefly in the form of the barbel. Named for Miss Ethelwynn Trewavas, in recognition of her work on the 'Dana' Stomiatoids.

A coloured sketch of the barbel of this species was made by Mr E. R. Gunther on board the 'Discovery'. The proximal swelling and the small swelling just behind it were pale yellow, the large bulb in the distal portion turquoise, and the distal bulb cream-coloured with a bright yellow tip. The central axis was said to be pigmented with black along its centre, and all the bulbs and swellings were enclosed in a wide transparent coating of pale blue.

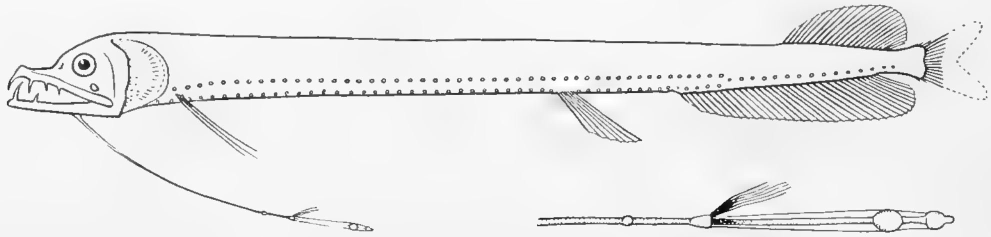

Fig. 23. *Eustomias* (*Nominostomias*) *trewavasae*. Holotype. (× 2.) [Barbel × 6.]

Haplostomias tentaculatus, Regan and Trewavas.

Regan and Trewavas, 1930, *t.c.* p. 109, pl. xi, fig. 1, text-figs.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 1 specimen, 204 mm.

Depth of body equal to length of head, which is 8 in length of fish. Diameter of eye $5\frac{3}{4}$ in length of head, about as long as postocular luminous organ. Barbel twice as long as head, with black stem and white ovate bulb; axis of stem prolonged along edge of bulb, distally becoming free and forming a tentacle-like appendage. Dorsal 16. Anal 19. Pectoral 5. Pelvic 7. Photophores—in ventral series I–P 8 + 2; P–V 27; V–A 15; A–C 9 or 10: in lateral series O–V 25; V–A 14.

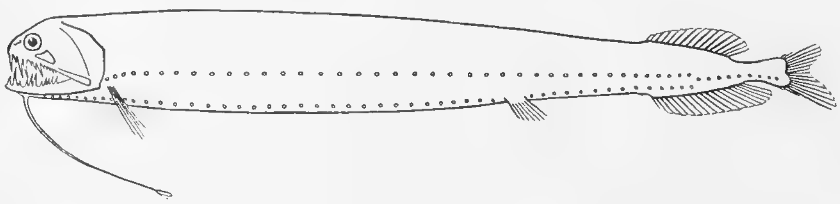

Fig. 24. *Haplostomias tentaculatus*. (× $\frac{1}{2}$.)

Described from a single specimen, 204 mm. in length.

The largest specimen studied by Regan and Trewavas was 100 mm. in length, and the accompanying figure illustrates the difference in the form of the body in the two fishes.

Echiostoma tanneri (Gill, 1883).

Regan and Trewavas, *t.c.* p. 117, fig. 113.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 2 specimens, 170–200 mm.

Hab. Atlantic; Gulf of Mexico; Caribbean Sea.

Idiacanthus niger, Regan, 1914.

Regan and Trewavas, *t.c.* p. 128, fig. 124.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 1 specimen, 105 mm.

St. 107. 4. xi. 26. 45° 03′ 00″ S, 17° 03′ 00″ E. 4½ m. net, horizontal, 850–950 m.: 2 specimens, 425–440 mm.

St. 244. 9. vi. 27. 38° 26′ 30″ S, 24° 48′ 30″ W. 70 cm. tow-net, horizontal, 93 m.: 1 specimen, 98 mm.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. Young-fish trawl, 250 (–0) m.: 1 specimen, 145 mm.

Hab. South Atlantic; New Zealand; Chile.

Fig. 25. Barbel of *Idiacanthus niger*. (× 1½.)

Macrostomias longibarbatus, Brauer.

Brauer, 1902, *Zool. Anz.* XXV, p. 283; '*Valdivia*' *Tiefsee-Fische*, p. 52, pl. iii, fig. 2.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850–950 (–0) m.: 1 specimen, 95 mm.

Hab. Atlantic and Indian Oceans.

Stomias ferox, Reinhardt, 1842.

Ege, 1918, *Rep. Danish Ocean. Exped.* (1908–10), II, A, 4, p. 3.

10. x 25. 41° 37′ 15″ N, 12° 30′ 20″ W. 2 m. tow-net, horizontal, 900 (–0) m.: 1 specimen, 88 mm.

Hab. North Atlantic.

Stomias affinis, Günther.

Günther, 1887, *Deep-Sea Fish. 'Challenger'*, p. 205, pl. liv, fig. A; Goode and Bean, 1895, *Ocean. Ichth.* p. 108, fig. 129; Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 588; Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 51.

Stomias elongatus, Wood-Mason and Alcock, 1891, *Ann. Mag. Nat. Hist.* (6), VIII, p. 129; Alcock, 1899, *Cat. Indian Deep-Sea Fish.* p. 147.

Stomias valdiviae, Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 48, pl. iii, fig. 1, text-figs. 11–13.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. Young-fish trawl, 150 (–0) m.: 2 specimens, 32–110 mm.

St. 280. 10. viii. 27. 00° 36′ 00″ S, 8° 28′ 00″ E. Young-fish trawl, 100–200 (–0) m.: 1 specimen, 158 mm.

St. 282. 12. viii. 27. 1° 11′ 00″ S, 5° 38′ 00″ E. Young-fish trawl, 300 (–0) m.: 1 specimen, 55 mm.

Hab. Atlantic; West Indies; Indian Ocean.

I have examined the type of *Stomias affinis* (120 mm.), and also the type of *S. elongatus* (105 mm.), lent for examination by the Indian Museum.

Stomias atlanticus, Pappenheim.

Pappenheim, 1914, *Deutsche Südpolar-Exped.* XV, *Zool.* VII, p. 169.

St. 109. 5. xi. 26. 46° 25′ 00″ S, 15° 13′ 00″ E. 1 m. tow-net, horizontal, 192 m.: 1 specimen, 240 mm.

Depth of body 16 in the length, length of head $10\frac{1}{2}$. Snout shorter than eye, diameter of which is $4\frac{1}{4}$ in length of head and about equal to interorbital width. Praemaxillary with 5 teeth, of which the second is enlarged and fang-like; a few minute teeth on the

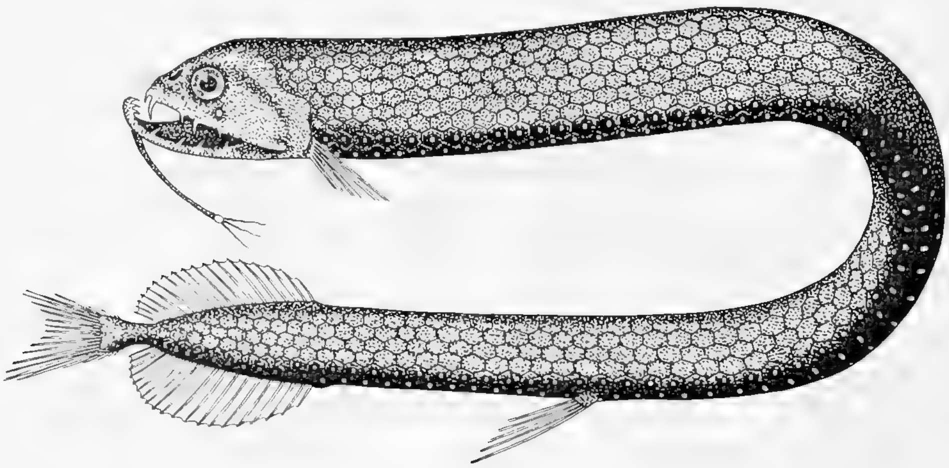

Fig. 26. *Stomias atlanticus*. (× 1.)

maxillary; mandible with 7 or 8 teeth; a single pair of vomerine teeth and 1 or 2 on each palatine. Barbel $\frac{3}{4}$ length of head, trifid at its extremity. Dorsal 18. Anal 20. Photophores—in ventral series I–P 11; P–V 46; V–A 12; A–C 15 (?): in lateral series 58.

Described from a single specimen, 240 mm. in length.

Hab. South Atlantic.

Stomias colubrinus, Garman, 1899.

Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 47, fig. 10.

The 'Discovery' obtained 34 specimens of this species from the following stations in the North and South Atlantic, at depths ranging from 0–950 m., measuring from 55 to 265 mm. in length: St. 170, 269, 270, 276, 281, 282, 296, 297.

Hab. Atlantic; Pacific coast of Central America.

Family MALACOSTEIDAE

This family has also been recently monographed by Regan and Trewavas (1930, *Ocean Rep. Danish 'Dana'-Exped.* (1920–22), VI, pp. 133–143, pls. xiii, xiv, text-figs.).

Photostomias guernei, Collett, 1889.

Regan and Trewavas, *t.c.* p. 134, figs.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 1 specimen, 32 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. $4\frac{1}{2}$ m. net, horizontal, 900 (–0) m.: 1 specimen, 140 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 1 specimen, 92 mm.

Hab. Atlantic; Caribbean Sea.

In the male specimen the eye measures $3\frac{2}{3}$ in the length of the head, and the postocular organ is very large, $2\frac{2}{3}$ in length of lower jaw. In these characters it approaches *P. atrox*, Alcock, but the shape of the luminous organ appears to be different. In the female the eye is about equal to the postocular luminous organ, and 5 in length of head.

Aristostomias xenostoma, Regan and Trewavas.

Regan and Trewavas, 1930, *t.c.* p. 139, pl. xiii, fig. 3, text-figs. 133–134.

St. 286. 17. viii. 27. 3° 06′ 30″ S, 3° 53′ 00″ W. Young-fish trawl, 102–0 m.: 1 specimen, 55 mm.

Hab. Atlantic; Caribbean Sea.

Malacosteus niger, Ayres, 1857.

Regan and Trewavas, *t.c.* p. 142, fig. 138.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. $4\frac{1}{2}$ m. net, horizontal, 2000 (–0) m.: 1 specimen, 150 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 1 specimen, 120 mm.

St. 100. 2. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. Young-fish trawl, 625–675 m.: 2 specimens, 75–95 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net. horizontal, 850–950 m.: 1 specimen, 140 mm.

St. 298. 29. viii. 27. 13° 01′ 45″ N, 21° 34′ 45″ W. Young-fish trawl, 900–1200 (–0) m.: 1 specimen, 30 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. $4\frac{1}{2}$ m. net, horizontal, 900 (–0) m.: 10 specimens, 80–155 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 1 specimen, 75 mm.

Hab. Atlantic; Indian Ocean.

Order INIOMI

Family SUDIDAE

Sudis bronsoni, Parr.

Parr, 1928, *Bull. Bingham Ocean. Coll.* III (3), p. 36, fig. 3.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 650 (–0) m.: 1 specimen, 26 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 1 specimen, 55 mm.

Hab. Atlantic; West Indies.

The larger of these specimens agrees very closely with the description of *S. bronsoni*, but the diameter of the eye is markedly smaller, being contained about $2\frac{4}{5}$ in the length of the snout and about 6 times in that of the head, as compared with $2\frac{1}{4}$ and $4\frac{1}{3}$ times respectively in the type of the species. Mr Parr has been kind enough to compare the larger of the 'Discovery' specimens with the type, and writes that in general appearance, body form, pigmentation, position of fins, etc., they are perfectly alike, and that, apart from the size of the eye, he is unable to detect any other differences. I have, therefore, identified these examples with his species until sufficient material is available to make possible a study of the individual variations in these fishes.

Sudis kroyeri (Lütken, 1892).

Parr, *t.c.* p. 39.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 2 specimens, 70–95 mm.

St. 100. 2. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. Young-fish trawl, 625–675 m.: 1 specimen, 100 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. $4\frac{1}{2}$ m. net, horizontal, 125–175 (–0) m.: 1 specimen, 45 mm.

Hab. Atlantic.

Family MYCTOPHIDAE[1]

Scopelopsis multipunctatus, Brauer.

Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 146, fig. 71.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 1 specimen, 36 mm.

Hab. Off South Africa.

Genera **Myctophum, Lampanyctus, Diaphus, Lampadena**[2]

The species included in the above-mentioned genera are very numerous, but, since some of them have been briefly and often quite inadequately described, a certain

[1] I am much indebted to Mr A. Fraser-Brunner for assistance in determining many of the specimens of *Myctophum*, *Lampanyctus*, *Diaphus* and *Lampadena*. His preliminary sorting of the material has greatly facilitated my work on these genera.

[2] As suggested by Tåning, further investigation will probably lead to the recognition of more than four well-defined genera in this group.

number of nominal species are probably included among them. Brauer [1906, '*Valdivia*' *Tiefsee-fische*, pp. 150–251], who included all the species in a single genus, *Myctophum*, was the first to reduce the chaos to some sort of order, and in quite recent years other investigators have added still further to our knowledge of the group. In 1928 Parr [*Bull. Bingham Ocean. Coll.* III (3), pp. 49–156] published a complete synopsis of the four genera, based on the collections made in the Western Atlantic and West Indies by the 'Pawnee', and described a number of new species. His keys to the species have proved useful in determining many of the 'Discovery' specimens, and as a groundwork, but, as many of the types of the species preserved in various museums and institutions were inaccessible to him, these keys are necessarily somewhat tentative. In the same year Tåning [*Vid. Medd. Dansk nat. For.* 86, pp. 49–69] published a preliminary synopsis of the species of the North Atlantic, and he is at present engaged in studying the large amount of material obtained in this and other regions by the 'Dana'. This synopsis has proved of great value and interest, since, in addition to the 'Dana' material from the Atlantic, Tåning has examined some specimens from the Gulf of Panama and from the Malay Archipelago, and has also studied most of the type specimens of these genera preserved in various European and other museums. In a recent paper [1929, *Ann. Mag. Nat. Hist.* (10), IV, pp. 510–15] I have published brief notes and descriptions of certain specimens in the British Museum collection, as a supplement to the works of Parr and Tåning. In the present report I give for each species a reference to the pages and figures in the papers of Brauer, Parr and Tåning.

Genus **Myctophum**, Rafinesque, 1810

The group of species distinguished by having no Pol photophores, and the AO forming a single continuous series, may be arranged as follows:—

I. Lens of the eye excentric, dorsal.
   - A. The two first SAO and the two Prc separated from one another by wide interspaces. 1. *parallelum*, Lönnberg, 1905
   - B. The first two SAO and the two Prc normally spaced. 2. *arcticum* (Lütken, 1892)

II. Lens of eye normal, central.
   - A. Depth of body less than 3 in the length, length of head $2\frac{1}{2}$ to 3; eye $1\frac{7}{8}$ to $2\frac{1}{4}$ in head. AO 10–12. 3. *rissoi* (Cocco, 1829)
   - B. Depth of body more than 3 in the length, length of head 3 to 4; eye $2\frac{1}{5}$ to 3 in head.
     1. No SAO photophores; AO 14–15, first two elevated. 4. *anderssoni*, Lönnberg, 1905
     2. 3 SAO photophores; AO 15–18, none elevated.
        - *a.* Origin of anal just behind last dorsal ray; dorsal commencing a little behind root of pelvic; 2 PVO, close together and side by side. 5. *tenisoni*, n.sp.
        - *b.* Origin of anal below dorsal, which commences well behind root of pelvic; 2 PVO placed one above the other.
          - * Eye $2\frac{1}{3}$ to nearly 3 in the head; posterior margin of maxillary truncate; origin of anal below middle of dorsal. 6. *antarcticum* (Günther, 1878)
          - ** Eye $2\frac{1}{4}$ to $2\frac{1}{2}$ in head; posterior margin of maxillary rounded; origin of anal below posterior part of dorsal. 7. *subasperum* (Günther, 1864)

Myctophum parallelum, Lönnberg.

Lönnberg, 1905, *Zool. Anz.* XXVIII, p. 764; 1905, *Wiss. Ergebn. Schwed. Südpolar-Exped.* V (6), p. 62; Parr, 1928, *Bull. Bingham Ocean. Coll.* III (3), p. 57.

Myctophum (*Myctophum*) *parallelum*, Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 174, fig. 86.

St. 78. 12. vi. 26. 35° 18′ 00″ S, 19° 01′ 10″ W. Young-fish trawl, 1000 (–0) m.: 1 specimen, 17 mm.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. 4½ m. net, horizontal, 2000 (–0) m.: 1 specimen, 20 mm.

St. 100. 4. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. Young-fish trawl, 2500 (–0) m.: 2 specimens, 30–31 mm.

St. 100. 4. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. Young-fish trawl, 2500–2000 m.; 2 specimens, 27–29 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net, horizontal, 350–400 (–0) m.: 2 specimens, 29–30 mm.

Depth of body about $3\frac{1}{2}$ in the length, length of head $3\frac{1}{5}$ to $3\frac{1}{4}$. Diameter of eye $2\frac{1}{3}$ to $2\frac{1}{2}$ in length of head. Dorsal 12. Anal 22. Pectoral 15. Pelvic 8. PLO photophore on lower part of pectoral base. 2 PVO, situated close together and side by side, below base of pectoral fin. 5 PO, all level. VLO nearer pelvic fin than lateral line. 4 VO, the second scarcely elevated. 3 SAO, interspace between first and second greater than that between second and third, forming a very obtuse angle. AO 15, forming an almost straight line, 4 behind last anal ray. Prc fairly well separated.

Described from several specimens, 17 to 31 mm. in length.

Hab. Off South-west Africa; South Atlantic.

Myctophum rissoi (Cocco, 1829).

Brauer, *t.c.* p. 170, fig. 83; Tåning, 1928, *Vid. Medd. Dansk nat. For.* 86, p. 52; Parr, *t.c.* p. 58.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 1 specimen, 15 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net, horizontal, 350–400 (–0) m.: 3 specimens, 63–72 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. 4½ m. net, horizontal, 125–175 (–0) m.: 3 specimens, 21–23 mm.

Hab. Mediterranean; Atlantic; Indian Ocean.

Myctophum anderssoni, Lönnberg.

Scopelus antarcticus (*non* Günther), Boulenger, 1902, *Rep. Coll. Nat. Hist.* '*Southern Cross*', V, *Pisces*, p. 174.

Myctophum anderssoni, Lönnberg, 1905, *Zool. Anz.* XXVIII, p. 763; 1905, *Wiss. Ergebn. Schwed. Südpolar-Exped.* V (6), p. 61; Parr, 1928, *t.c.* p. 58.

Myctophum (*Myctophum*) *anderssoni*, Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 172, fig. 84.

St. 64. 22. v. 26. 48° 34′ 00″ S, 53° 34′ 30″ W. 1 m. tow-net, horizontal, 90 (–0) m.: 2 specimens, 18–21 mm.

Depth of body $4\frac{1}{4}$ to $4\frac{1}{3}$ in the length, length of head $3\frac{1}{2}$. Diameter of eye about 3 in length of head. Dorsal 12. Anal 18–19. Pectoral 14. Pelvic 8. PLO photophore on

lower part of pectoral base, forming a straight line with the two PVO, which lie close together and side by side. 5 PO (6 on one side in the 'Southern Cross' specimen), all level. VLO much nearer pelvic fin than lateral line. 4 VO, all level. No SAO. AO 14–15, the first 2 elevated, the remainder forming a more or less straight line, 4 behind the last anal ray. Prc close together, second scarcely elevated.

Described from three specimens, 18 to 55 mm. in length.

Hab. South Atlantic; Antarctic (Victoria Land).

The types of this species, 22 and 60 mm. in length, were in poor condition, and the SAO photophores were described as missing, but their absence in all the specimens described above suggests that this is the normal condition. It is possible, however, that the so-called anterior AO, which are elevated above the level of the remainder, should be regarded as belonging to the SAO series.

Myctophum tenisoni, n.sp.

St. 36. 18. iii. 26. 38 miles N 39° E of Jason Light, South Georgia. 1 m. tow-net, horizontal, 90 (–0) m.: 1 specimen, 65 mm.

St. 44. 3. iv. 26. 32 miles N 51° E of Jason Light, South Georgia. 1 m. tow-net, horizontal, 170 (–0) m.: 2 specimens, 64–69 mm.

St. 65. 22. v. 26. 48° 18′ 00″ S, 53° 09′ 00″ W. 2 m. tow-net, horizontal, 120 (–0) m.: 1 specimen, 32 mm.

St. 72. 1. vi. 26. 41° 43′ 20″ S, 42° 20′ 40″ W. $4\frac{1}{2}$ m. net, horizontal, 2000 (–0) m.: 3 specimens, 36–46 mm.

St. 107. 4. xi. 26. 45° 03′ 00″ S, 17° 03′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 1 specimen, 50 mm.

St. 109. 5. xi. 26. 46° 25′ 00″ S, 15° 13′ 00″ E. 1 m. tow-net, horizontal, 96 m.: 3 specimens, 42–47 mm. (Largest selected as the holotype.)

St. 114. 12. xi. 26. 52° 25′ 00″ S, 9° 50′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 650–700 (–0) m.: 2 specimens, 43–60 mm.

St. 217. 18. iv. 27. Drake Strait, 58° 27′ 30″ S, 67° 55′ 00″ W. 1 m. tow-net, horizontal, 77 m.: 2 specimens, 35–36 mm.

St. 239. 2. vi. 27. 46° 56′ 00″ S, 46° 03′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1050–1350 (–0) m.: 2 specimens, 25–27 mm.

Depth of body $3\frac{7}{8}$ to $4\frac{1}{4}$ in the length, length of head 3 to $3\frac{2}{5}$. Snout much shorter than eye, diameter of which is $2\frac{3}{5}$ to 3 in length of head and much greater than the interorbital width. Angle of praeoperculum nearly vertical. Maxillary expanded behind, extending to a little beyond posterior margin of eye; lower jaw a little projecting. Dorsal 11–13; origin slightly behind root of pelvic; longest rays about $\frac{2}{3}$ head. Anal 22–24; origin just behind last dorsal ray. Pectoral 14–15; $\frac{3}{4}$ to $\frac{4}{5}$ length of head. Pelvic 8. About 42 scales in the lateral line. A very small antorbital luminous organ above the nostril and a somewhat larger one below the anterior part of the eye; 2 on the praeoperculum, the upper larger and level with the upper edge of the maxillary; 3 below the lower jaw, the middle one the largest. PLO on lower part of pectoral base. 2 PVO, close together and side by side. 5 PO, all level. VLO much nearer pelvic fin than lateral line. 4 VO, the second scarcely elevated. 3 SAO, all close together and nearly

forming a straight line; the interspace between first and second greater than that between second and third. AO 17–18, none elevated, 3 or 4 behind last anal ray. No Pol. 2 Prc, close together, second scarcely elevated. 6 or 7 luminous scales on upper edge of caudal peduncle (♂) or 4 or 5 on lower edge (♀). Uniformly silvery.

Described from nine specimens, 35 to 69 mm. in length.

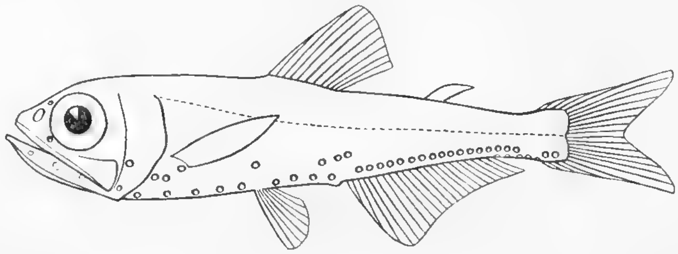

Fig. 27. *Myctophum tenisoni*. Holotype. (× $1\frac{1}{2}$.)

Hab. Southern Atlantic (south of 46°); Antarctic.

Named for Lieut.-Col. W. P. C. Tenison, D.S.O., who is responsible for the illustrations in the text of this report.

Myctophum antarcticum (Günther).

Scopelus antarcticus, Günther, 1878, *Ann. Mag. Nat. Hist.* (5), II, p. 184; 1887, *Deep-Sea Fish. 'Challenger'*, p. 196, pl. li, fig. D.

Myctophum antarcticum, Lönnberg, 1905, *Wiss. Ergebn. Schwed. Südpolar-Exped.* v (6), p. 60; Roule, 1913, *Deux. Expéd. Antarct. Franç.* (1908–10), *Fish.* p. 20; Regan, 1913, *Trans. R. Soc. Edinburgh*, XLIX, p. 234; 1916, *Larval Fishes 'Terra Nova'*, p. 127, pl. i, figs. 1–3; Parr, 1928, *t.c.* p. 58.

Myctophum (*Myctophum*) *antarcticum*, Brauer, 1906, *t.c.* p. 168, fig. 82; Pappenheim, 1914, *Deutsche Südpolar-Exped.* XV, *Zool.* VII (2), p. 192; Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 240.

St. 114. 12. xi. 26. 52° 25′ 00″ S, 9° 50′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 650–700 (–0) m.: 19 specimens, 14–80 mm.

St. 116. 14. xi. 26. 54° 30′ 00″ S, 5° 34′ 00″ E. 70 cm. tow-net, horizontal, 139 m.: 1 specimen, 70 mm.

St. 121. 25. xi. 26. 50° 59′ 00″ S, 11° 44′ 00″ W. 1 m. tow-net, horizontal, 58 m.: 1 specimen, 50 mm.

St. 197. 3. iv. 27. Bransfield Strait, South Shetlands, 62° 27′ 00″ S, 58° 11′ 30″ W. 1 m. tow-net, horizontal, 134 m.: 1 specimen, 78 mm.

St. 202. 5. iv. 27. Bransfield Strait, South Shetlands, 62° 48′ 00″ S, 60° 05′ 00″ W. 1 m. tow-net, horizontal, 188 (–0) m.: 1 specimen, 95 mm.

St. 267. 23. vii. 27. 24° 31′ 00″ S, 12° 15′ 30″ E. 1 m. tow-net, oblique, 117 (–0) m.: 1 specimen, 21 mm.

St. WS 30. 19. xii. 26. 53° 34′ 15″ S, 38° 36′ 15″ W. 1 m. tow-net, horizontal, 134 (–67) m.: 1 specimen, 65 mm.

Depth of body $3\frac{1}{2}$ to $4\frac{1}{4}$ in the length, length of head $3\frac{1}{3}$ to nearly 4. Diameter of eye $2\frac{1}{3}$ to nearly 3 in length of head (in specimens over 60 mm.). Posterior margin of

maxillary truncate, a little behind posterior edge of eye. Dorsal 13–14; origin well behind root of pelvic. Anal 19–21; origin nearly below middle of dorsal. Pectoral 13–15. Pelvic 8. About 40 scales in the lateral line. PLO photophore on lower part of pectoral base. 2 PVO, close together and one above the other, forming a right-angle with PLO. 5 PO, the last very little elevated. VLO nearer pelvic fin than lateral line. 4 VO, all level. 3 SAO, forming an obtuse angle, interspace between first and second a little greater than that between second and third. AO 17–18, almost in a straight line, 4 behind last anal ray. No Pol. 2 Prc, rather close together, the second a little elevated. 6 or 7 luminous scales on upper edge of caudal peduncle, or 5 on the lower edge.

Described from several specimens, 35 to 95 mm. in length, including the types of the species.

Hab. Circumpolar in southern seas.

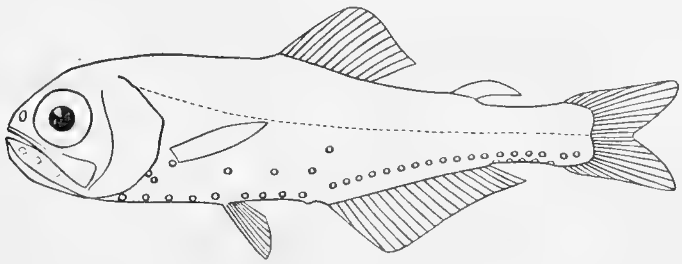

Fig. 28. *Myctophum antarcticum.* (× 1.)

Myctophum subasperum (Günther).

Scopelus subasper, Günther, 1864, *Cat. Fish.* v, p. 411; Lütken, 1892, *Vid. Selsk. Skr.* (6), VII, p. 240, fig. 1.

Myctophum megalops, Peters, 1865, *Monatsber. Akad. Berlin* (1864), p. 393.

? *Scopelus colletti*, Lütken, 1892, *t.c.* p. 249, fig. 7.

? *Benthosema colletti*, Goode and Bean, 1895, *Ocean. Ichth.* p. 78.

Dasyscopelus subasper, Goode and Bean, 1895, *t.c.* p. 92.

Myctophum (*Myctophum*) *subasperum*, Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 175, fig. 87.

Myctophum antarcticum, Gilbert, 1911, *Bull. Amer. Mus. Nat. Hist.* XXX, p. 13; Regan, 1914, *Fishes* '*Terra Nova*', p. 1; Waite, 1916, *Fish. Austral. Antarct. Exped.* p. 59, pl. iv, fig. 2, text-fig. 13.

Myctophum subasperum, Parr, 1928, *Bull. Bingham Ocean. Coll.* III (3), p. 58.

St. 78. 12. vi. 26. 35° 18′ 00″ S, 19° 01′ 10″ W. Young-fish trawl, 1000 (–0) m.: 19 specimens, 17–23 mm. ?

St. 104. 31. x. 26. 41° 33′ 30″ S, 17° 58′ 00″ W. 1 m. tow-net, horizontal, 0–5 m.: 1 specimen, 32 mm.

Close to *M. antarcticum.* Depth of body $3\frac{3}{4}$ to $4\frac{1}{4}$ in the length, length of head $3\frac{1}{2}$ to nearly 4. Diameter of eye $2\frac{1}{5}$ to $2\frac{1}{2}$ in length of head. Posterior margin of maxillary rounded, the maxillary scarcely extending beyond hinder edge of eye. Dorsal 13–14. Anal 21–22; origin below posterior part of dorsal. Pectoral 16 (?). Pelvic 8. 38 to 40 scales in the lateral line; those on the upper part of the body in adults with deeply crenulated edges, giving them a ctenoid appearance. PVO more widely separated and

SAO forming a much less obtuse angle than in *M. antarcticum*. AO 15–16, forming a continuous series in which three more or less distinct groups may be recognised; first two nearer anal base than the remainder, 9 or 10 arranged in a slight ~-shaped curve, and 4 behind the anal fin parallel with those of the opposite side. One to three luminous scales on upper or lower edge of the caudal peduncle.

Described from five specimens, 32 to 95 mm. in length, including the type of the species.

Hab. South Atlantic; Antarctic; Tasmania; South Pacific.

This species seems to have been confused with the preceding by some authors, and some of the references given under *M. antarcticum* may refer to *M. subasperum*.

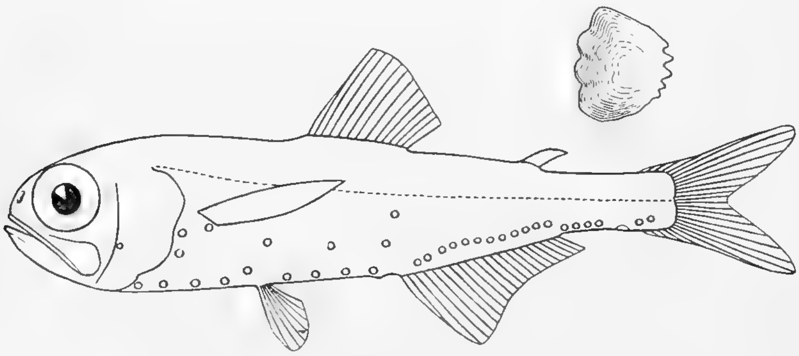

Fig. 29. *Myctophum subasperum*. (× 1.) [Scale × 3.]

Myctophum interruptum, Tåning.

Tåning, 1928, *t.c.* p. 56; Parr, *t.c.* p. 59.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 1 specimen, 35 mm.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. Young-fish trawl, 250 (–0) m.: 1 specimen, 28 mm.

The larger of the two specimens was coloured a brilliant silver on the sides in life, on which silver photophores were just discernible: the dorsal surface was a brilliant iridescent deep metallic blue.

Myctophum glaciale (Reinhardt, 1837).

Brauer, *t.c.* p. 80, fig. 92; Tåning, *t.c.* p. 56; Parr, *t.c.* p. 60

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net. horizontal, 900 (–0) m.: 14 specimens, 45–50 mm.

Hab. North Atlantic and Arctic waters.

Myctophum laternatum, Garman, 1899.

Brauer, *t.c.* p. 178, figs. 90–91; Tåning, *t.c.* p. 56 (var. *atlanticum*); Parr, *t.c.* pp. 61, 67.

The 'Discovery' obtained 15 specimens of this species from the following stations in the Atlantic, at depths ranging from 0–2500 m., measuring 11 to 27 mm. in length: St. 86, 89, 100, 285, 287, 288, 289, 296.

Hab. Atlantic; Indian and Pacific Oceans

Myctophum fibulatum, Gilbert and Cramer, 1897.

Parr, *t.c.* pp. 61, 67.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. Young-fish trawl, 250 (–0) m.: 1 specimen, 30 mm.

Hab. West Indies; South Atlantic; Hawaiian Islands.

Myctophum coccoi (Cocco, 1829).

Brauer, *t.c.* p. 199, figs. 116–120; Tåning, *t.c.* p. 55; Parr, *t.c.* p. 61.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 1 specimen, 18 mm.

St. 247. 13. vi. 27. 37° 20′ 00″ S, 12° 47′ 30″ W. Young-fish trawl 100–115 (–0) m.: 1 specimen, 33 mm.

Hab. Mediterranean; Atlantic; Indian Ocean; Pacific.

Myctophum asperum, Richardson, 1845.

Brauer, *t.c.* p. 197, fig. 115; Tåning, *t.c.* p. 54; Parr, *t.c.* p. 63.

16. vii. 26. 3° 45′ N, 12° 48′ W. Washed on board: 1 specimen, 60 mm.

Hab. Atlantic; Pacific; Australian seas.

I have compared the type of this species with one of the types of *Dasyscopelus naufragus*, Waite, and find them identical.

Myctophum humboldti (Risso, 1810).

Brauer, *t.c.* p. 192, figs. 108–111; Tåning, *t.c.* p. 54; Parr, *t.c.* p. 64.

St. 7. 3. ii. 26. Washed on board: 1 specimen, 69 mm.

St. 71. 30. v. 26. 43° 20′ 00″ S, 46° 02′ 00″ W. Young-fish trawl, 2000 (–0) m.: 3 specimens, 38–46 mm.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 6 specimens, 16–23 mm.

St. 100. 2. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. Young-fish trawl, 625–675 m.: 1 specimen, 40 mm.

Hab. Mediterranean; Atlantic; Pacific (?).

Myctophum affine (Lütken, 1892).

Brauer, *t.c.* p. 190, figs. 105–107; Tåning, *t.c.* p. 53; Parr, *t.c.* pp. 65, 69.

St. 240. 2. vi. 27. 46° 36′ 30″ S, 45° 07′ 00″ W. 1 m. tow-net, horizontal, 0–5 m.: 1 specimen, 17 mm.

St. 297. 28. viii. 27. 12° 08′ 00″ N, 20° 53′ 30″ W. Young-fish trawl, 200–300 (–0) m.: 7 specimens, 12–30 mm.

Hab. Atlantic; Indian Ocean; Pacific.

Myctophum phengodes (Lütken, 1892).

Brauer, *t.c.* p. 177, fig. 88; Parr, *t.c.* p. 66.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 1 specimen, 24 mm.

Hab. Atlantic; Indian Ocean; Australian seas.

Myctophum macrochir (Günther, 1864).

Tåning, *t.c.* p. 57; Parr, *t.c.* pp. 67, 74.

St. 71. 30. v. 26. 43° 20′ 00″ S, 46° 02′ 00″ W. Young-fish trawl, 2000 (–0) m.: 6 specimens, 28–32 mm.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850–950 (–0) m.: 1 specimen, 20 mm.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 1 specimen, 11 mm.

St. 289. 24. viii. 27. 3° 04′ 45″ N, 16° 52′ 00″ W. 70 cm. tow-net, oblique, 132–0 m.: 1 specimen, 16 mm.

St. 297. 28. viii. 27. 12° 08′ 00″ N, 20° 53′ 30″ W. Young-fish trawl, 200–300 (–0) m.: 1 specimen, 12 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 1 specimen, 37 mm.

Hab. Atlantic; West Indies.

Genus **Lampanyctus**, Bonaparte, 1840

Lampanyctus nicholsi, Gilbert.

Gilbert, 1911, *Bull. Amer. Mus. Nat. Hist.* XXX, p. 17, fig. 1; Parr, *t.c.* p. 78.

St. 60. 21. v. 26. 50° 45′ 00″ S, 56° 33′ 00″ W. 1 m. tow-net, horizontal, 75 (–0) m.: 1 specimen, 40 mm.

St. 62. 22. v. 26. 49° 22′ 00″ S, 54° 48′ 00″ W. 1 m. tow-net, horizontal, 90 (–0) m.: 1 specimen, 43 mm.

St. 106. 3. xi. 26. 44° 42′ 30″ S, 17° 47′ 00″ E. 1 m. tow-net, horizontal, 124 m.: 1 specimen, 75 mm.

St. 217. 18. iv. 27. Drake Strait, 58° 27′ 30″ S, 67° 55′ 00″ W. 1 m. tow-net, horizontal, 77 m.: 1 specimen, 71 mm.

St. WS 236. 6. vii. 28. 46° 55′ 00″ S, 60° 40′ 00″ W. Net with mesh of 7 mm. attached to back of trawl, 272–300 m.: dark green sand and mud. 25 specimens, 50–77 mm.

Depth of body $5\frac{1}{4}$ to nearly 6 in the length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$. Snout much shorter than eye, diameter of which is $3\frac{3}{4}$ to 4 in length of head and about equal to interorbital width. Dorsal 18–20; origin a little in advance of root of pelvic; longest rays $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Anal 20–22; origin below posterior part of dorsal. Pectoral 13. Pelvic 8. 43–45 scales in the lateral line. PLO photophore a little nearer to lateral line than pectoral fin. 2 PVO, situated close together, level with base of pectoral fin. 5 PO, the last a little elevated. VLO about equidistant from lateral line and pelvic fin or a little nearer the latter. 5 VO, all level. 3 SAO, almost forming a straight line, the lowest continuous with the VO series; interspace between first and second not much

less than that between second and third, which is close to lateral line. AO in two groups, well separated from one another; anterior 9–11, the first elevated and level with the middle SAO, the last sometimes a little elevated; posterior 7, generally well separated from Prc series, although in one or two specimens the two are continuous. 2 (occasionally 3) Pol, the upper just below the lateral line. 6–9 Prc. No luminous scales on caudal peduncle.

Described from numerous specimens, 43–77 mm. in length.

Hab. South Atlantic; Falkland Islands; Drake Strait.

Lampanyctus braueri (Lönnberg).

Myctophum (*Lampanyctus*) *braueri*, Lönnberg, 1905, *Zool. Anz.* XXVIII, p. 764; 1905, *Wiss. Ergebn. Schwed. Südpolar-Exped.* V (6), p. 64, fig. 1; Brauer, 1906, *t.c.* p. 230, fig. 150.

Lampanyctus braueri, Regan, 1913, *Trans. R. Soc. Edinburgh*, XLIX, p. 234; Waite, 1916, *Fish. Austral. Antarct. Exped.* p. 61, fig. 14; Parr, 1928, *t.c.* p. 78.

St. 62. 22. v. 26. 49° 22′ 00″ S, 54° 48′ 00″ W. 1 m. tow-net, horizontal, 90 (–0) m.: 1 specimen, 31 mm.

St. 66. 23. v. 26. 48° 09′ 00″ S, 52° 50′ 00″ W. 1 m. tow-net, horizontal, 45 m.: 1 specimen, 45 mm. 1 m. tow-net, horizontal, 90 (–0) m.: 3 specimens, 34–45 mm.

St. 151. 16. i. 27. 53° 25′ 00″ S, 35° 15′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1025–1275 m.: 2 specimens, 85–133 mm.

St. 239. 2. vi. 27. 46° 56′ 00″ S, 46° 03′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1050–1350 m.: 2 specimens, 31–34 mm.

St. 256. 23. vi. 27. 35° 14′ 00″ S, 6° 49′ 00″ E. Young-fish trawl, 850–1100 m.: 3 specimens, 20–32 mm.

Depth of body $5\frac{2}{5}$ to $5\frac{3}{5}$ in the length, length of head $3\frac{1}{4}$ to $3\frac{1}{2}$. Snout shorter than eye, diameter of which is $4\frac{1}{4}$ to $4\frac{1}{2}$ in length of head and less than interorbital width. Dorsal 15; origin above or a little behind root of pelvic. Anal 18. Pectoral 13. Pelvic 8. 42–45 scales in the lateral line. PLO photophore rather nearer to lateral line than pectoral fin. 2 PVO, close together, level with pectoral base. 5 PO, fourth nearer to middle of thorax than the remainder, which are more or less level. VLO about equidistant from lateral line and pelvic fin. 5 VO, second, third and fourth a little elevated. 3 SAO, forming a straight line, the lowest level with middle VO. Anterior AO 9 or 10, the first elevated; well separated from posterior AO which number 8–10. 4 or 5 Prc, separated from or continuous with the posterior AO, the last separated by a wide interspace from the remainder. 2 Pol. No luminous scales on the caudal peduncle.

Described from 10 specimens, 20 to 133 mm. in length.

Hab. South Atlantic; Antarctic; Macquarie Island.

Lampanyctus townsendi (Eigenmann and Eigenmann).

Myctophum townsendi, Eigenmann and Eigenmann, 1889, *West. Amer. Sci.* VI, No. 48, p. 125.

Scopelus (*Nyctophus*) *warmingii*, Lütken, 1892, *Vid. Selsk. Skr.* (6), VII, p. 259, fig. 19.

Lampanyctus warmingi, Goode and Bean, 1895, *Ocean. Ichth.* p. 80; Tåning, 1928, *t.c.* p. 65; Parr, 1928, *t.c.* p. 91, fig. 11.

Lampanyctus townsendi, Jordan and Evermann, 1896, *Bull. U.S. Nat. Mus.* XLVII (1), p. 558; Gilbert, 1908, *Mem. Mus. Comp. Zool.* XXVI, p. 230, pl. iv; 1913, *Mem. Carnegie Mus.* VI, p. 98; McCulloch, 1923, *Rec. Austral. Mus.* XIV, p. 115, pl. xiv, fig. 2; Parr, 1928, *t.c.* p. 79.

Myctophum (*Lampanyctus*) *townsendi*, Brauer, 1906, *t.c.* p. 167.

Myctophum (*Lampanyctus*) *warmingi*, Brauer, 1906, *t.c.* p. 229, fig. 149; Pappenheim, 1914, *Deutsche Südpolar-Exped.* XV, *Zool.* VII (2), p. 195; Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 237.

The 'Discovery' obtained 14 specimens of this species from the following stations in the North and South Atlantic, at depths ranging from 0–2000 m., measuring 17 to 67 mm. in length: St. 80, 85, 104, 257, 270, 285, 286, 287, 288, 294, 296, 297.

Depth of body $4\frac{1}{4}$ to $4\frac{3}{4}$ in the length, length of head 3 to $3\frac{1}{4}$. Snout much shorter than eye, diameter of which is 3 to $3\frac{1}{2}$ in length of head and equal to or greater than interorbital width. Dorsal 13–15; origin above or a little in front of or behind root of pelvic. Anal 13–15; origin below last rays of dorsal. Pectoral 13–15; about as long as head, extending to origin of anal or beyond. Pelvic 8. 36–38 scales in the lateral line. PLO photophore much nearer to lateral line than pectoral fin. 2 PVO, well separated from each other, one opposite the pectoral base, the other vertically below it. 5 PO, the last a little elevated. VLO equidistant from lateral line and pelvic fin or rather nearer the latter. 5 VO, the second, third and fifth a little elevated. 3 SAO, very slightly angulate, interspace between first and second less than that between second and third; third SAO touching the lateral line. AO 5–6 + 4–6; last of anterior series sometimes a little elevated; posterior series all behind the anal fin. 2 Pol, the upper in contact with the lateral line. 4 Prc, the interspace between the third and fourth much greater than that between the remainder. A luminous scale above the pectoral fin and a group of 2–7 in the neighbourhood of the lower PVO; a plate sometimes present above axil of pelvic; a series of 2 to 4 plates between root of pelvic and vent, and often one on each side of the vent; 3 to 5 plates at base of anal, not extending to hinder end of fin; a series of plates on upper and lower edges of caudal peduncle, those below extending forward nearly as far as the anal fin; 3 to 5 small plates on middle part of base of dorsal fin, and sometimes another series in front of this fin; no plates in front of the adipose fin.

Described from 10 specimens, 27–67 mm. in length, including two of the types of the species from the Cortes Banks, California.

Hab. North and South Atlantic; Indian Ocean; Pacific.

Lampanyctus hectoris (Günther).

Scopelus hectoris, Günther, 1876, *Ann. Mag. Nat. Hist.* (4), XVII, p. 399.
Scopelus argenteus, Gilchrist, 1904, *Mar. Invest. S. Afric.* III, p. 15, pl. XXXVI.
Myctophum (*Lampanyctus*) *argenteus*, Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 238.
Lampanyctus argenteus, Parr, 1928, *t.c.* p. 83.

St. 99 D. 27. ix. 26. 33° 20′ 00″ to 33° 11′ 00″ S, 17° 17′ 00″ to 17° 26′ 00″ E. 70 cm. tow-net, horizontal, 200 m.: 1 specimen, 57 mm.

Depth of body $4\frac{1}{2}$ to 5 in the length, length of head $3\frac{1}{4}$ to $3\frac{1}{2}$. Snout much shorter than eye, diameter of which is $3\frac{1}{4}$ to $3\frac{4}{5}$ in length of head and equal to or less than interorbital width. Dorsal 13–14; origin above or a little behind root of pelvic. Anal 15–16; origin below last dorsal ray or a little farther back. Pectoral 13–14. Pelvic 8. 37 to 39

scales in the lateral line. PLO photophore much nearer to pectoral fin than lateral line. 2 PVO, close together and more or less level with lower part of pectoral base. 5 PO, first, second and fourth forming a straight line near middle of thorax, third and fifth elevated, level with root of pelvic. VLO nearer pelvic fin than lateral line. 5 VO, forming a curved line, the third most elevated. 3 SAO, forming a straight oblique line, the lowest near to the last VO. AO 8 + 6, the two series well separated. 1 Pol, about equidistant from lateral line and ventral series of photophores. 5 Prc, well separated from posterior AO, the last about equidistant from lateral line and lower edge of caudal peduncle. No luminous scales.

Described from 7 specimens, 40 to 57 mm. in length, including the type of the species and co-types of *L. argenteus*.

Hab. Off South Africa; New Zealand.

Lampanyctus elongatus (Costa, 1844).

Brauer, *t.c.* p. 232, figs. 152–153; Tåning, *t.c.* p. 64; Parr, *t.c.* p. 80.

St. 168. 21. ii. 27. 60° 58′ 00″ S, 48° 05′ 00″ W. Young-fish trawl, 100–150 (–0) m.: 1 specimen, 52 mm.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 1 specimen, 30 mm.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 1 specimen, 53 mm.

St. 293. 24. viii. 27. 4° 18′ 15″ N, 16° 51′ 00″ W. Young-fish trawl, 100–120 (–0) m.: 1 specimen, 50 mm.

Hab. Mediterranean; North and South Atlantic; Antarctic; Pacific.

Lampanyctus photothorax, Parr.

Parr, 1928, *t.c.* pp. 81, 95, fig. 13.

St. 256. 23. vi. 27. 35° 14′ 00″ S, 6° 49′ 00″ E. Young-fish trawl, 850–1100 (–0) m.: 1 specimen, 25 mm.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850–950 (–0) m.: 1 specimen, 42 mm.

Hab. North and South Atlantic; West Indies.

Lampanyctus guentheri, Goode and Bean, 1895.

Tåning, *t.c.* p. 65; Parr, *t.c.* p. 82.

The 'Discovery' obtained 39 specimens of this species from the following stations in the North and South Atlantic, at depths ranging from 0–1500 m., measuring 21 to 70 mm. in length: St. 66, 69, 76, 240, 241, 242, 268, 281, 284, 286, 288, 289, 293, 296, 297.

Hab. North and South Atlantic; Australian seas (?).

Lampanyctus pusillus (Johnson, 1890).

Tåning, *t.c.* p. 66; Parr, *t.c.* pp. 89, 112.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. 4½ m. net, horizontal, 2000 (–0) m.: 1 specimen, 28 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 3 specimens, 30–34 mm.

St. 89. 28. vi. 26. 34° 05′ 15″ S, 16° 00′ 45″ E. Young-fish trawl, 1000 (–0) m.: 1 specimen, 25 mm.

St. 100. 4. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. Young-fish trawl, 2000–2500 (–0) m.: 2 specimens, 33–35 mm.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. Young-fish trawl, 250 (–0) m.: 1 specimen, 31 mm.

Hab. North and South Atlantic.

Lampanyctus alatus, Goode and Bean, 1895.

Lampanyctus pseudoalatus, Tåning, 1928, *t.c.* p. 66; Parr, 1928, *t.c.* p. 90.
Lampanyctus alatus, Parr, 1929, *Proc. U.S. Nat. Mus.* LXXVI (10), p. 25, fig. 12.

The 'Discovery' obtained 65 specimens of this species from the following stations in the North and South Atlantic, at depths ranging from 0–1500 m., measuring 18 to 102 mm. in length: St. 66, 76, 101, 239, 257, 281, 284, 285, 286, 289, 294, 296, 297.

Hab. North and South Atlantic; (?) Indian Ocean.

Lampanyctus festivus, Tåning.

Tåning, 1928, *t.c.* p. 67; Parr, *t.c.* p. 84.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 2 specimens, 84–90 mm.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. Young-fish trawl, 250 (–0) m.: 1 specimen, 31 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. 4½ m. net, horizontal, 125–175 (–0) m.: 1 specimen, 60 mm.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 1 specimen, 52 mm.

Hab. North and South Atlantic.

Lampanyctus intricarius, Tåning.

Tåning, 1928, *t.c.* p. 67; Parr, *t.c.* p. 90.

St. 76. 5. vi. 26. 39° 50′ 30″ S, 36° 23′ 00″ W. 4½ m. net, horizontal, 1500 (–0) m.: 2 specimens, 60–100 mm.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 3 specimens, 40–55 mm.

St. 100. 2. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. Young-fish trawl, 625–675 m.: 4 specimens, 62–68 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net, horizontal, 850–950 m.: 3 specimens, 68–115 mm.

St. 107. 4. xi. 26. 45° 03′ 00″ S, 17° 03′ 00″ E. 4½ m. net, horizontal, 850–950 m.: 10 specimens, 70–115 mm.

St. 250. 17. vi. 27. 36° 09′ 00″ S, 5° 33′ 00″ W. Young-fish trawl, 300 (–0) m.: 1 specimen, 46 mm.

Hab. North and South Atlantic.

Lampanyctus ater, Tåning.

Tåning, 1928, *t.c.* p. 68; Parr, *t.c.* p. 88.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 4 specimens, 55–61 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net. horizontal, 350–400 (–0) m.: 1 specimen, 142 mm.

St. 239. 2. vi. 27. 46° 56′ 00″ S, 46° 03′ 00″ W. 4½ m. net, horizontal, 1050–1350 (–0) m.: 1 specimen, 140 mm.

St. 259. 26. vi. 27. 34° 59′ 00″ S, 16° 39′ 00″ E. Young-fish trawl, 370–450 (–0) m.: 1 specimen, 30 mm. ?

Hab. North and South Atlantic.

Lampanyctus micropterus (Brauer, 1904).

Brauer, 1906, *t.c.* p. 239, fig. 157; Parr, *t.c.* p. 85.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. 1 m. tow-net, oblique, 124 (–0) m.: 1 specimen, 58 mm.

Hab. Atlantic and Indian Oceans.

Lampanyctus niger (Günther, 1887).

Brauer, *t.c.* p. 242, fig. 159; Parr, *t.c.* p. 87.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. 4½ m. net, horizontal, 650 (–0) m.: 12 specimens, 30–70 mm.

St. 241. 5. vi. 27. 40° 34′ 30″ S, 36° 35′ 30″ W. 1 m. tow-net, horizontal, 152 m.: 1 specimen, 75 mm.

St. 252. 20. vi. 27. 35° 26′ 00″ S, 1° 43′ 30″ E. 1 m. tow-net, horizontal, 135 mm.: 1 specimen, 40 mm.

Hab. South Atlantic; Indian Ocean; Pacific.

Lampanyctus, sp.

The 'Discovery' also obtained 32 examples of *Lampanyctus*, which are all in bad condition, and cannot be specifically identified with any certainty. These specimens are from the following stations in the North and South Atlantic, at depths ranging from 0–1410 m., and measure 15 to 130 mm. in length: St. 65, 78, 81, 83, 86, 101, 151, 269. Two are from the stomach of a Blue whale taken near the South Shetlands.

Genus **Diaphus**, Eigenmann and Eigenmann, 1891

Diaphus dumerili (Bleeker, 1856).

Tåning, *t.c.* p. 58; Parr, *t.c.* p. 126.

St. 280. 10. viii. 27. 00° 36′ 00″ S, 8° 28′ 00″ E. Young-fish trawl, 100–200 (–0) m.: 1 specimen, 47 mm.

Hab. Tropical Atlantic; Indo-Pacific.

Diaphus dofleini (Zugmayer, 1911).

Tåning, *t.c.* p. 58; Parr, *t.c.* p. 124.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. 4½ m. net, horizontal, 2000 (–0) m.: 1 specimen, 34 mm.

St. 250. 17. vi. 27. 36° 09′ 00″ S, 5° 33′ 00″ W. Young-fish trawl, 300 (–0) m.: 2 specimens, 34–42 mm.

St. 251. 18. vi. 27. 35° 54′ 30″ S, 3° 01′ 30″ W. 1 m. tow-net, horizontal, 79 m.: 1 specimen, 30 mm. 1 m. tow-net, horizontal, 159 m.: 1 specimen, 48 mm.

St. 254. 21. vi. 27. 35° 04′ 00″ S, 2° 59′ 30″ E. Young-fish trawl, 200 (–0) m.: 2 specimens, 33–34 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. 4½ m. net, horizontal, 125–175 (–0) m.: 4 specimens, 34–40 mm.

St. 286. 17. viii. 27. 3° 06′ 30″ S, 3° 53′ 00″ W. Young-fish trawl, 125 (–0) m.: 1 specimen, 47 mm.

St. 294. 25. viii. 27. 4° 33′ 15″ N, 16° 52′ 45″ W. Young-fish trawl, 100–150 (–0) m.: 1 specimen, 43 mm.

Hab. Mediterranean; Atlantic.

Perhaps identical with *D. gemellari* (Cocco).

Diaphus fulgens, Brauer, 1904.

Brauer, 1906, *t.c.* p. 224, fig. 146; Parr, *t.c.* p. 117.

St. 3. 3. xii. 25. 29° 31′ 06″ S, 13° 56′ 45″ W. 2 m. tow-net, horizontal, 500–700 m.: 1 specimen, 39 mm.

Hab. Atlantic and Indian Oceans.

Diaphus taaningi, n.sp.

St. 280. 10. viii. 27. 00° 36′ 00″ S, 8° 28′ 00″ E. Young-fish trawl, 100–200 (–0) m.: 1 specimen, 36 mm.

Depth of body nearly 4 in the length, length of head about 3½. Snout much shorter than eye, diameter of which is nearly 3 in length of head and about equal to interorbital width. Maxillary not expanded posteriorly, extending to well beyond eye. Operculum with a short rounded membranous process above the pectoral fin. 13 gill-rakers on lower part of anterior arch. Dorsal 14; origin a very little behind root of pelvic. Anal 13; origin behind last dorsal ray. Pectoral with 11 or 12 rays, a little more than ½ length of head. Pelvic 8. 35 scales in a longitudinal series. Upper antorbital (dorsonasal) luminous organ small, rounded, entirely above nostril and well separated from that of opposite side. No lower antorbital. A single suborbital (ventronasal) organ, rather broad and of moderate length, extending to a little beyond anterior margin of pupil, connected with the upper antorbital merely by a black pigmented band along the anterior margin of the eye. No supraorbital organ. A large luminous scale at PLO, which is nearer to pectoral fin than lateral line. 2 PVO, the upper on lower part of pectoral base, the lower a little in advance. 5 PO, the fourth elevated, opposite the space between the third and fifth, about level with upper PVO. VLO slightly nearer pelvic fin than lateral line. 5 VO, second and third progressively elevated, forming a straight line with

the first; fourth and fifth level. 3 SAO, forming an almost vertical straight line, the lowest close behind and a little above level of last VO; interspace between first and second less than that between second and third; third SAO well below lateral line. AO 5 + 5; first photophore of anterior series elevated, above level of second SAO; those of posterior series all level. Pol well below lateral line, about level with third SAO. 4 Prc, more or less equally spaced and forming an even curve, the last distinctly below lateral line. No luminous plates on upper or lower edges of caudal peduncle. Uniform brownish black.

Described from a single specimen, 36 mm. in length; holotype of the species.

Hab. Middle Atlantic.

This species appears to be very close to *D. fulgens*, Brauer, differing chiefly in the form of the suborbital organs and the lower position of the PLO, VLO, SAO_3, Pol and Prc_4 photophores. Mr Tåning has studied two of Brauer's types of *D. fulgens*, respectively 10 and 22 mm. in length, but the larger example of 39 mm. is not in the collection of the Zoological Museum at Berlin. He has kindly examined the specimen described above, and informs me that in his opinion this should probably be regarded as a species new to science, but adds that the species of this particular group of *Diaphus* are very difficult to identify. He tells me that both the small types of *D. fulgens* have a small posterior suborbital organ, which is not shown in Brauer's figure of the species.

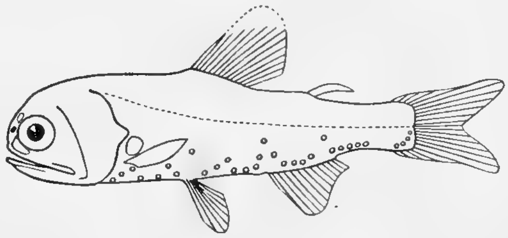

Fig. 30. *Diaphus taaningi*. Holotype. (× 1½.)

Diaphus luetkeni (Brauer, 1904).

Brauer, 1906, *t.c.* p. 221, figs. 141–142; Tåning, *t.c.* p. 59; Parr, *t.c.* p. 118.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 1 specimen, 45 mm.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. Young-fish trawl, 250 (–0) m.: 2 specimens, 31–35 mm.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850–950 (–0) m.: 1 specimen, 42 mm.

St. 284. 15. viii. 27. 2° 13′ 00″ S, 1° 52′ 00″ E. 1 m. tow-net, oblique, 71 (–0) m.: 1 specimen, 38 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. 4½ m. net, horizontal, 125–175 (–0) m.: 2 specimens, 40–45 mm.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 3 specimens, 33–45 mm.

St. 289. 23–24. viii. 27. 3° 04′ 45″ N, 16° 52′ 00″ W. Young-fish trawl, 125–225 (–0) m.: 4 specimens, 34–43 mm. 70 cm. tow-net, oblique, 132 (–0) m.: 1 specimen, 18 mm.

Hab. Atlantic and Indian Oceans.

Diaphus brachycephalus, Tåning.

Tåning, 1928, *t.c.* p. 59; Parr, *t.c.* p. 119.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 2 specimens, 22–25 mm.

St. 293. 24. viii. 27. 4° 18′ 15″ N, 16° 51′ 00″ W. Young-fish trawl, 100–120 (–0) m.: 1 specimen, 26 mm.

Depth of body $3\frac{1}{2}$ in the length, length of head about 3. Diameter of eye a little less than 3 in length of head. Dorsal 13; origin opposite root of pelvic. Anal 14; origin a little behind last dorsal ray. Pectoral 12 (?). Pelvic 9. 32 scales in the lateral line. Photophores all large. Upper antorbital organ small, rounded, entirely above nostril and well separated from that of opposite side. First suborbital long and narrow, extending from nostril to behind lens of eye; second small, oval in shape, situated close behind the first. No supraorbital organ. PLO without luminous scale, much nearer pectoral fin than lateral line. 2 PVO, the lower below pectoral base. 5 PO, the interspace between first and second greater than that between any of the remainder; fourth elevated, opposite space between third and fifth. VLO much nearer pelvic fin than lateral line. 5 VO, third elevated, second, fourth and fifth level. 3 SAO, third about equidistant from lateral line and ventral series of photophores. AO 4–5 + 4; fifth anteroanal a little elevated. Pol well below lateral line. 4 Prc, forming a slight curve.

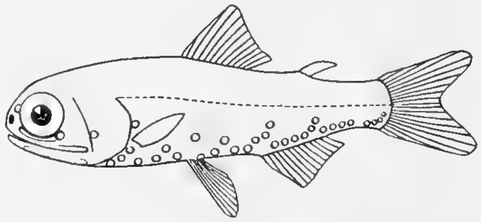

Fig. 31. *Diaphus brachycephalus*. (× 2.)

Described from two specimens, 22–25 mm. in length.

Hab. Atlantic.

Diaphus rafinesquei (Cocco, 1838).

Brauer, *t.c.* p. 223, figs. 144–145; Tåning, *t.c.* p. 60; Parr, *t.c.* pp. 119, 131, figs.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 350–400 (–0) m.: 7 specimens, 25–70 mm.

St. 241. 5. vi. 27. 40° 34′ 30″ S, 36° 35′ 30″ W. 70 cm. tow-net, horizontal, 49 (–0) m.: 1 specimen, 20 mm.

St. 257. 24. vi. 27. 35° 01′ 00″ S, 10° 18′ 00″ E. Young-fish trawl, 250 (–0) m.: 3 specimens, 16–18 mm.

St. 266. 21. vii. 27. 29° 34′ 00″ S, 14° 24′ 00″ E. Young-fish trawl, 200 (–0) m.: 5 specimens, 20–32 mm.

St. 267. 23. vii. 27. 24° 31′ 00″ S, 12° 15′ 30″ E. Young-fish trawl, 450–550 (–0) m.: 6 specimens, 20–31 mm. 1 m. tow-net, oblique, 117 (–0) m.: 5 specimens, 18–36 mm.

St. 268. 25. vii. 27. 18° 37′ 00″ S, 10° 46′ 00″ E. Young-fish trawl, 100–150 (–0) m.: 2 specimens, 31–32 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. $4\frac{1}{2}$ m. net, horizontal, 125–175 (–0) m.: 3 specimens, 31–48 mm.

Hab. Mediterranean; Atlantic; Marquesas Islands; Japan.

I have examined more than fifty examples of this species from the Mediterranean and Atlantic and find that, as suggested by Parr, it is impossible to recognise Tåning's two species, *D. rafinesquei* and *D. holti*, in the Atlantic, although the Mediterranean material seems to fall readily into two forms. *D. mollis*, Tåning, may also prove to be identical with this species.

Diaphus lucidus (Goode and Bean, 1895).

Brauer, *t.c.* p. 164; Tåning, *t.c.* p. 62; Parr, *t.c.* pp. 121, 141, fig. 31.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. $4\frac{1}{2}$ m. net, horizontal, 125–175 (–0) m.: 2 specimens, 75–85 mm.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 1 specimen, 60 mm.

Hab. Atlantic.

Diaphus splendidus (Brauer, 1904).

Brauer, 1906, *t.c.* p. 218, figs. 138–139; Tåning, *t.c.* p. 60; Parr, *t.c.* p. 123.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. $4\frac{1}{2}$ m. net, horizontal, 125–175 (–0) m.: 3 specimens, 26–30 mm.

The 'Discovery' also obtained the following specimens of *Diaphus*, which are either very young or poorly preserved, and cannot be identified with certainty:—

Diaphus sp.

St. 240. 2. vi. 27. 46° 36′ 30″ S, 45° 07′ 00″ W. 1 m. tow-net, horizontal, 0–5 m.: 1 specimen, 12 mm.

St. 247. 13. vi. 27. 37° 20′ 00″ S, 12° 47′ 30″ W. Young-fish trawl, 100–115 (–0) m.: 1 specimen, 33 mm.

St. 280. 10. viii. 27. 00° 36′ 00″ S, 8° 28′ 00″ E. Young-fish trawl, 100–200 (–0) m.: 7 specimens, 12–15 mm.

Genus **Lampadena**, Goode and Bean, 1895

Lampadena braueri, Zugmayer, 1914.

Tåning, *t.c.* p. 63; Parr, *t.c.* p. 149.

St. 269. 26. vii. 27. 15° 55′ 00″ S, 10° 35′ 00″ E. Young-fish trawl, horizontal, 600–700 (–0) m.: 2 specimens, 88–94 mm.

Depth of body $4\frac{1}{4}$ to $4\frac{1}{2}$ in the length, length of head $3\frac{1}{4}$ to $3\frac{2}{5}$. Snout about $\frac{1}{4}$ diameter of eye, which is twice or a little more than twice in length of maxillary, $\frac{7}{8}$ of the interorbital width, and about 3 in length of head. Dorsal 14–15; origin above root of pelvic, about equidistant from tip of snout and front of supracaudal plate. Anal 14–15; origin distinctly behind last dorsal ray. Pectoral 17. Pelvic 9. 40–42 scales in a longitudinal series (from upper angle of gill-opening to base of caudal). Photophores rather indistinct. PLO very close to lateral line. 2 PVO, the lower below the pectoral base.

5 PO, all level. VLO a little nearer lateral line than pelvic fin. 6 (?) VO, all level, the last in front of the origin of the anal. Only 2 SAO, the first nearer to the anal fin than to lateral line, a little posterior to the second, which is just below the lateral line. AO 6–7 + 2–3, all level; posteroanal series well behind the anal base and just in front of the infracaudal plate. 1 Pol, near the lateral line. 2–3 + 1 (?) Prc. Supracaudal plate emarginate posteriorly, shorter than infracaudal plate, which is a little more than $\frac{1}{2}$ length of head.

Described from two specimens, 88 to 94 mm. in length.

Hab. Eastern Atlantic.

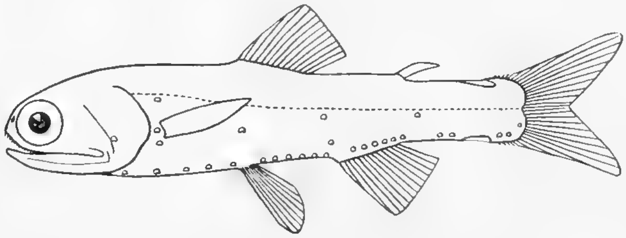

Fig. 32. *Lampadena braueri.* (× $\frac{3}{4}$.)

Lampadena minima, Tåning.

Tåning, 1928, *t.c.* p. 63; Parr, *t.c.* p. 154, fig. 37.

The following young specimens from the South Atlantic appear to belong to this species:—

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. 4½ m. net, horizontal, 2000 (–0) m.: 1 specimen, 20 mm.

St. 89. 28. vi. 26. 34° 05′ 15″ S, 16° 00′ 45″ E. Young-fish trawl, 1000 (–0) m.: 1 specimen, 19 mm.

Hab. Atlantic.

Lampadena nitida, Tåning.

Tåning, 1928, *t.c.* p. 62; Parr, *t.c.* p. 155.

St. 286. 17. viii. 27. 3° 06′ 30″ S, 3° 53′ 00″ W. Young-fish trawl, 102 (–0) m.: 1 specimen, 115 mm.

Depth of body $5\frac{1}{2}$ in the length, length of head $3\frac{1}{3}$. Snout about $\frac{1}{2}$ diameter of eye, which is $3\frac{1}{3}$ in length of maxillary, $\frac{2}{3}$ of the interorbital width, and $4\frac{3}{4}$ in length of head. Dorsal 15; origin in advance of root of pelvic, about equidistant from tip of snout and front of supracaudal plate. Anal 14; origin behind last ray of dorsal. Pectoral 16; about $\frac{2}{3}$ length of head. Pelvic 8. 37 scales in a longitudinal series (from upper angle of gill-opening to base of caudal). PLO rather close to lateral line. 2 PVO, the lower below pectoral base. 5 PO, the fourth vertically above the third. VLO about equidistant from lateral line and pelvic fin. 5 VO, nearly level. 3 SAO, interspace between second and third much greater than that between first and second. Upper SAO and Pol very close

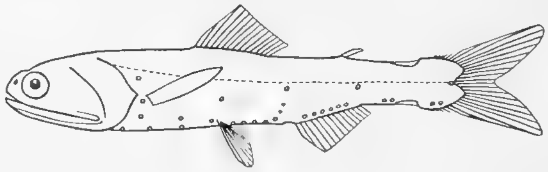

Fig. 33. *Lampadena nitida.* (× $\frac{1}{2}$.)

to lateral line. AO 5 + 2, all level; first posteroanal just in front of infracaudal plate, second above its anterior part. 2 + 1 Prc, the first two above procurrent spines of caudal fin, the third on lateral line at base of fin.

Described from a single specimen, 115 mm. in length.

Hab. Atlantic.

As far as one can judge from this single example, and from the descriptions of Parr and Tåning, the Atlantic form seems to be sufficiently distinct from that of the Indo-Pacific as described by Brauer, Garman, and Weber and Beaufort, to be recognised as a distinct species. It differs chiefly in the somewhat slenderer body, larger head, and in having 2 + 1 instead of 3 + 1 Prc photophores.

Order LYOMERI

Family EURYPHARYNGIDAE

Eurypharynx pelecanoides, Vaillant, 1888.

Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, xxxv, p. 88, pl. iv, fig. 3; Roule, 1919, *ibid.* LII, p. 93.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850–950 (–0) m.: 1 specimen, 295 mm.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 1 specimen, 170 mm.

Hab. Atlantic.

Order APODES

Family NEMICHTHYIDAE

A preliminary synopsis of the Eels of this family has been published by Roule and Bertin (*Bul. Mus. Paris*, 1924, p. 61).

Nemichthys scolopaceus, Richardson, 1848.

Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 126, pl. ix, fig. 1.

St. 85. 23. vi. 26. 33° 07′ 40″ S, 4° 30′ 20″ E. 4½ m. net, horizontal, 2000 (–0) m.: 1 specimen, 580 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 1 specimen, 750 mm.

St. 245. 10. vi. 27. 38° 20′ 00″ S, 22° 18′ 00″ W. 4½ m. net, horizontal, 1800–2000 m.: 1 specimen, 375 mm.[1]

St. 247. 13. vi. 27. 37° 20′ 00″ S, 12° 47′ 30″ W. Young-fish trawl, 100–115 (–0) m.: 1 specimen, 620 mm.

St. 268. 25. vii. 27. 18° 37′ 00″ S, 10° 46′ 00″ E. Young-fish trawl, 100–150 m.: 7 specimens, 430–500 mm.

St. 269. 26. vii. 27. 15° 55′ 00″ S, 10° 35′ 00″ E. 4½ m. net, horizontal, 600–700 (–0) m.: 6 specimens, 400–485 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 4 specimens, 470–720 mm.[1]

Hab. Mediterranean; Atlantic, Indian and Pacific Oceans.

[1] Tail incomplete.

Nematoprora polygonifera, Gilbert.

Gilbert, 1905, *Bull. U.S. Fish. Comm.* XXIII (1903), p. 587, fig. 234.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. $4\frac{1}{2}$ m. net, horizontal, 125–175 (–0) m.: 12 specimens, 220–300 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. $4\frac{1}{2}$ m. net, horizontal, 900 (–0) m.: 1 specimen, 260 mm.

Hab. Atlantic; Hawaiian Islands.

Avocettina infans (Günther, 1878).

Brauer, 1906, *t.c.* p. 129, pl. viii, figs. 5–6.

St. 72. 1. vi. 26. 41° 43′ 20″ S, 42° 20′ 40″ W. $4\frac{1}{2}$ m. net, horizontal, 2000 (–0) m.: 2 specimens, 450–470 mm.

St. 76. 5. vi. 26. 39° 50′ 30″ S, 36° 23′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1500 (–0) m.: 1 specimen, 360 mm.[1]

St. 79. 13. vi. 26. 34° 48′ 00″ S, 16° 36′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 1 specimen, 200 mm.[1]

Hab. Atlantic, Indian and Pacific Oceans.

Serrivomer beanii, Gill and Ryder, 1883.

Goode and Bean, 1895, *Ocean. Ichth.* p. 155, fig. 175.

St. 79. 13. vi. 26. 34° 48′ 00″ S, 16° 36′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 1 specimen, 295 mm.

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 650 (–0) m.: 5 specimens, 140–490 mm.

Hab. Atlantic, Indian and Pacific Oceans.

Family CONGRIDAE

Genus **Grammatocephalus**, gen. nov.

Body of moderate length, the tail a little shorter than the trunk, naked; dorsal and anal fins well developed, confluent with the caudal; pectorals present. Head with some large mucous pores, regularly arranged, and with a number of fine, close-set, and more or less parallel ridges, arranged in regular longitudinal, transverse and oblique series, more developed on the upper surface; snout broad and flat; nostrils lateral, neither with a tube. Mouth of moderate width, the angle below the posterior border of the eye; lower jaw included, much narrower than the upper. Teeth villiform, conical, forming rather broad bands in both jaws; similar teeth on the vomer, apparently arranged in a horseshoe-shaped patch. Tongue free. Gill-openings widely separated, forming narrow slits of moderate size. Pores of lateral line distinct.

Genotype. *Grammatocephalus kempi*, n.sp.

[1] Tail incomplete.

Grammatocephalus kempi, n.sp.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 1 specimen, 160 mm. Holotype.

Depth of body about 20 in the length, length of head (measured from tip of snout to anterior edge of gill-opening) $3\frac{1}{4}$ in the distance from posterior edge of gill-opening to vent; head as broad as deep, its depth less than its length; snout broadly rounded anteriorly, with a shallow median emargination, about as broad as long, its length $4\frac{1}{2}$ in that of head and a little greater than the diameter of the eye. Anterior nostril equidistant from end of snout and posterior nostril, which is in front of upper part of eye. Origin of dorsal well behind gill-opening, about equidistant from tip of snout and vent. Pectoral more than twice as long as diameter of eye. More or less uniformly brownish above, lighter beneath.

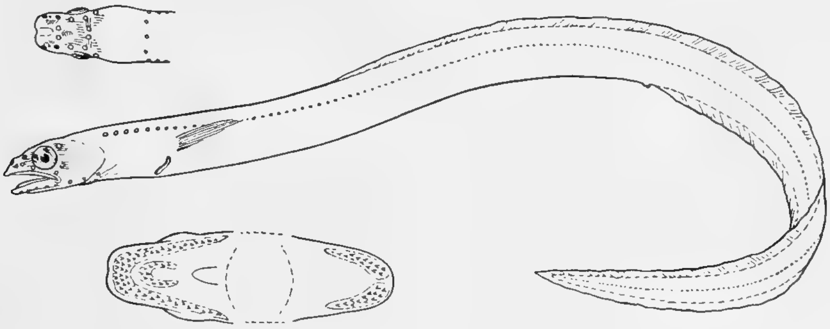

Fig. 34. *Grammatocephalus kempi*. Holotype. (× 1.) [View of open mouth × 2.]

Described from a single specimen, 160 mm. in length; holotype of the species.[1]

Hab. Off South Africa.

Grammatocephalus seems to be most closely related to *Promyllantor*, Alcock, and *Pseudophichthys*, Roule, but is readily distinguished by the position of the vent, the dentition, and the presence of ridges on the head.

Order SYNENTOGNATHI

Family EXOCOETIDAE

Halocypselus evolans (Linnaeus, 1758).

13. i. 28. 01° 00′ S, 31° 20′ W. Washed on board: 1 specimen, 55 mm.

Order ANACANTHINI

Family GADIDAE

Bregmaceros maclellandi, Thompson.

Thompson, 1840, *Mag. Nat. Hist.* N.S. IV, p. 184, fig.; Günther, 1864, *Cat. Fish.* IV, p. 368; Day, 1865, *Fish. Malabar*, p. 171; 1877, *Fish. India*, p. 418; Alcock, 1883, *J. Asiat. Soc. Bengal*,

[1] Named in honour of Dr Stanley Kemp, Director of Research, Discovery Expedition.

LXII (2), p. 181; Günther, 1888, *Pelagic Fish. 'Challenger'*, p. 25, pl. iii, figs. A–B; Goode and Bean, 1895, *Ocean. Ichth.* pp. 388, 531; Jordan and Evermann, 1898, *Bull. U.S. Nat. Mus.* XLVII (3), p. 2527; Alcock, 1899, *Cat. Indian Deep-Sea Fish*, p. 75; Weber, 1913, *Fische 'Siboga'-Exped.* p. 174; Gilchrist and Thompson, 1914, *Ann. S. Afric. Mus.* XIII, p. 87; 1917, *Ann. Durban Mus.* I, p. 320; Barnard, 1925, *Ann. S. Afric. Mus.* XXI, p. 325; Weber and Beaufort, 1929, *Fish. Indo-Austral. Arch.* V, p. 6, fig. 2.

Calloptilum mirum, Richardson, 1845, *Zool. Voyage 'Sulphur'*, p. 95, pl. xlvi, figs. 4–7.

Asthenurus atripinnis, Tickell, 1864, *J. Asiat. Soc. Bengal*, XXXIV (2), p. 32, fig.

Bregmaceros atripinnis, Day, 1869, *Proc. Zool. Soc.* p. 522; 1877, *Fish. India*, p. 418, pl. xci, fig. 1.

Bregmaceros atlanticus, Goode and Bean, 1886, *Bull. Mus. Comp. Zool.* XII, p. 165; 1895, *Ocean. Ichth.* p. 388, fig. 331; Borodin, 1928, *Bull. Vanderbilt Ocean. Mus.* I (1), p. 13.

Bregmaceros bathymaster, Jordan and Bollman, 1890, *Proc. U.S. Nat. Mus.* XII, p. 173.

St. 277. 7. viii. 27. 1° 44′ 00″ S, 8° 38′ 00″ E. Young-fish trawl, 63 (–0) m.: 2 specimens, 43–45 mm.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850 m.: 1 specimen, 35 mm.

St. 284. 15. viii. 27. 2° 13′ 00″ S, 1° 52′ 00″ E. 1 m. tow-net, oblique, 71–0 m.: 1 specimen, 27 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 2 specimens, 39–42 mm.

Hab. Atlantic, Indian and Pacific Oceans.

I have examined a fairly representative series of specimens of this species from several localities, and am unable to detect any marked differences between those from the Atlantic and Indo-Pacific respectively. There seems to be little doubt that *B. atlanticus* is, at the most, a race of *B. maclellandi*.

Melanonus gracilis, Günther.

Günther, 1878, *Ann. Mag. Nat. Hist.* (5), II, p. 19; 1887, *Deep-Sea Fish. 'Challenger'*, p. 84, pl. xiv, fig. B; Goode and Bean, 1895, *Ocean. Ichth.* p. 380, fig.; Brauer, 1906, *'Valdivia' Tiefsee-Fische*, p. 277, pl. xii, fig. 5.

St. 72. 1. vi. 26. 41° 43′ 20″ S, 42° 20′ 40″ W. $4\frac{1}{2}$ m. net, horizontal, 2000 (–0) m.: 1 specimen, 140 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 3 specimens, 50–70 mm.

St. 100. 4. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. Young-fish trawl, 2500 (–0) m.: 1 specimen, 67 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 2 specimens, 67–72 mm.

St. 239. 2. vi. 27. 46° 56′ 00″ S, 46° 03′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1050–1350 (–0) m.: 3 specimens, 100–160 mm.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. Young-fish trawl, 150 (–0) m.: 3 specimens, 15–47 mm.

Depth of body $6\frac{1}{4}$ to $6\frac{1}{2}$ in the length, length of head $5\frac{1}{3}$ to $5\frac{1}{2}$. Snout $3\frac{1}{5}$ to $3\frac{1}{4}$ in length of head, diameter of eye 4 to $4\frac{1}{2}$, interorbital width $2\frac{1}{3}$. Maxillary extending to below posterior border of eye or not quite as far; both jaws with narrow bands of minute villiform teeth; similar teeth generally present on vomer, palatines and pterygoids.

About 70 scales in a longitudinal series. Dorsal 5–8 + 59–67 +. Anal 52–54 +. Third dorsal + caudal + second anal about 50. Pectoral 12–14. Pelvic 7.

Described from 5 specimens, 67 to 142 mm. in length, including the type of the species.

Hab. South Atlantic; Antarctic.

Melanonus zugmayeri, n.sp.

Melanonus gracilis (*non* Günther), Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, xxxv, p. 120, pl. vi, fig. 1.

St. 270. 27. vii. 27. 13° 58′ 30″ S, 11° 43′ 30″ E. Young-fish trawl, 200 (–0) m.: 1 specimen, 110 mm. Holotype.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 6 specimens, 23–58 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. $4\frac{1}{2}$ m. net, horizontal, 900 (–0) m.: one specimen, 50 mm.

Depth of body $4\frac{2}{3}$ to $5\frac{1}{3}$ in the length, length of head a little more than 4. Snout $3\frac{1}{2}$ in length of head, diameter of eye $4\frac{3}{4}$ to 5, interorbital width $2\frac{1}{3}$. Maxillary extending nearly to below posterior edge of eye; teeth all stronger than in *M. gracilis*; a pair in

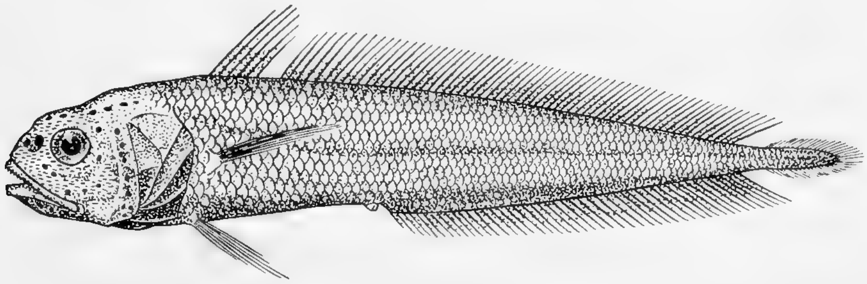

Fig. 35. *Melanonus zugmayeri*. Holotype. (× 1.)

front of upper jaw and some of those at sides of lower jaw somewhat enlarged; a single series of teeth on each side of the head of the vomer, and a similar row on each palatine. About 80 scales in a longitudinal series. Dorsal 6 + 64 +. Anal 50 + (?). Third dorsal + caudal + second anal about 50. Pectoral 13, about $\frac{2}{3}$ length of head. Pelvic 7.

Described from three specimens, 58 to 110 mm. in length. The largest is selected as the holotype.

Hab. North and South Atlantic.

Family MACRURIDAE

Cynomacrurus piriei, Dollo.

Dollo, 1909, *Proc. R. Soc. Edinburgh*, xxix, p. 316; Regan, 1913, *Trans. R. Soc. Edinburgh*, xlix, p. 236, pl. iii, fig. 1.

St. 9. 11. ii. 26. 46° 11′ 30″ S, 22° 27′ 30″ W. 2 m. tow-net, horizontal, 1250 (–0) m.: 1 specimen, 135 mm.

St. 71. 30. v. 26. 43° 20′ 00″ S, 46° 02′ 00″ W. Young-fish trawl, 2000 (–0) m.: 1 specimen, 80 mm.[1]

[1] Tail incomplete.

St. 76. 5. vi. 26. 39° 50′ 30″ S, 36° 23′ 00″ W. 4½ m. net, horizontal, 1500 (–0) m.: 1 specimen, 240 mm.

St. 151. 16. i. 27. 53° 25′ 00″ S, 35° 15′ 00″ W. 4½ m. net, horizontal, 1025–1275 m.: 2 specimens, 100–220 mm.[1]

Hab. South Atlantic (south of 39°); Antarctic.

The characteristic strong antero-lateral canines of this species are not developed in specimens under 135 mm. in length.

Order ALLOTRIOGNATHI

Family STYLOPHORIDAE

Stylophorus chordatus, Shaw.

Shaw, 1791, *Trans. Linn. Soc.* I, p. 90, pl. vi; Starks, 1908, *Bull. Mus. Comp. Zool.* LII, p. 17, pls.; Regan, 1924, *Proc. Royal Soc.* B, 96, p. 193, figs.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. Young-fish trawl, 150 (–0) m.: 1 specimen, 38 mm.

St. 296. 26. viii. 27. 8° 12′ 00″ N, 18° 49′ 00″ W. Young-fish trawl, 450–500 (–0) m.: 1 specimen, 185 mm.

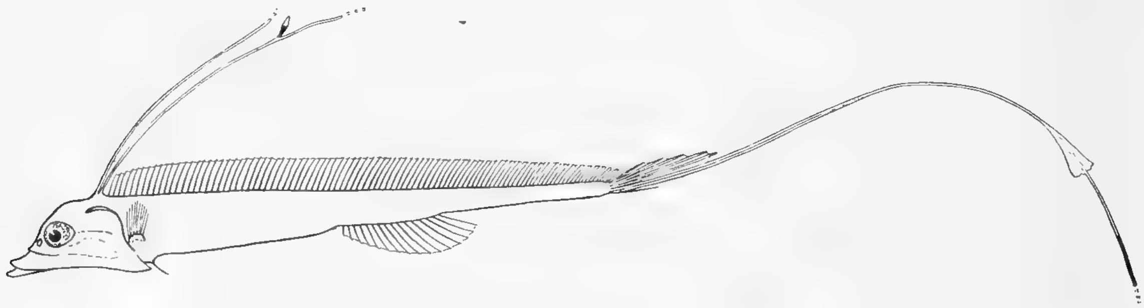

Fig. 36. Young specimen of *Stylophorus chordatus*. (× 2½.)

Hab. Atlantic; West Indies; south of Galapagos Islands.

In his diagnosis of this species Regan states that there are no pelvic fins, but an examination of the small specimen obtained by the 'Discovery' shows that these are present, and that each has the form of a single ray lying below the hinder part of the base of the pectoral fin. This is very fragile and is wanting on one side of the fish, and there is little doubt that these structures have been broken off in all the specimens previously studied.

Order BERYCOMORPHI

Family DIRETMIDAE

Diretmus argenteus, Johnson.

Johnson, 1863, *Proc. Zool. Soc.* p. 403, pl. xxxvi, fig. 2; Günther, 1887, *Deep-Sea Fish. 'Challenger'*, p. 45; Goode and Bean, 1895, *Ocean. Ichth.* p. 211, fig. 234; McCulloch, 1909, *Rec. Austral. Mus.* VII, p. 320; Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, XXXV, p. 107, pl. v, fig. 7; Roule, 1919, *ibid.* LII, p. 52.

[1] Tail incomplete.

Discus aureus, Campbell, 1879, *Trans. N. Zealand Inst.* XI, p. 298, fig.

Diretmus aureus, Günther, 1887, *t.c.* p. 45.

Gyrinomene nummularis, Vaillant, 1888, *Expéd. Sci. 'Travailleur' et 'Talisman', Poissons*, pp. 18, 355 (*n.n.*).

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. 4½ m. net, horizontal, 650 (–0) m.: 1 specimen, 55 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net, horizontal, 350–400 (–0) m.: 1 specimen, 60 mm.

Hab. North Atlantic; coast of New South Wales; New Zealand.

Zugmayer regards the fish described by Campbell from New Zealand as belonging to a distinct genus, but both Günther and McCulloch are of the opinion that it is specifically identical with *Diretmus argenteus*. *Discus* is said to differ from *Diretmus* in having no enlarged pelvic spine, and in the presence of denticulated scales on the abdomen. In both the examples obtained by the 'Discovery' (55 and 60 mm.) the pelvic spine is less developed than in the type of the species (90 mm.) preserved in the British Museum collection, and the ventral margin of the body is denticulated.

Family CARISTIIDAE

Caristius macropus (Bellotti).

Pteraclis macropus, Bellotti, 1903, *Atti Soc. Ital. Sci. Nat.* XLII, p. 137, pl. vi.

Caristius macropus, Jordan and Thompson, 1914, *Mem. Carnegie Mus.* VI, p. 243, pl. xxviii, fig. 7.

Elephenor macropus, Jordan, 1919, *Ann. Carnegie Mus.* XII, p. 330, pl. liv.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. 4½ m. net, horizontal, 125–175 (–0) m.: 1 specimen, 60 mm.

Depth of body 1¾ in the length, length of head 2¾. Body much compressed. Anterior profile of head nearly vertical. Diameter of eye about ⅓ length of head, a little greater than its distance from the maxillary. A number of radiating ridges on upper part of operculum ending in feeble spinous points; angle of praeoperculum and margin of suboperculum crenulated. Cheek and opercular bones scaly. Maxillary not expanded posteriorly, partially concealed by the praeorbital, extending to below anterior part of eye. A single series of small slender teeth in each jaw, and traces of similar teeth on vomer and palatines. Gill-rakers rather slender, of moderate length; 15 on lower part of anterior arch. Scales small, cycloid; irregularly arranged; some of those below the pectoral fin somewhat enlarged. No distinct lateral line. Dorsal 35. Anal 17. Bases of both dorsal and anal covered by a scaly sheath. Pectoral with 17 (?) rays. Pelvic I 5; origin just in front of base of pectoral, separated from origin of anal by a space which is nearly ¾ length of head; rays very long, reaching base of caudal when laid back. Caudal with 19 principal rays, of which 17 are branched; the spinous procurrent rays feeble. Uniformly greyish brown.

Described from a single specimen, 60 mm. in length.

Hab. Atlantic; Japan.

It is only after some hesitation that I have identified the specimen described above with Bellotti's species, as both his figure and that of Jordan and Thompson show a very narrow space between the eye and the maxillary, although in the description given by the American authors the cheek is said to be "deep and triangular, about four-fifths of the diameter of the eye in depth". Further, the mouth seems to be somewhat larger in the examples from Japan, and the diameter of the eye is said to be 2·33 to 2·5 in the length of the head. *Caristius japonicus*, Gill and Smith, of which *Platyberyx opalescens*, Zugmayer, may be a synonym [cf. Regan, 1912, *Ann. Mag. Nat. Hist.* (8), x, p. 637], is closely related to *C. macropus*, differing chiefly in the narrower cheek, larger eye, pluriserial teeth, and in the more anterior insertion of the pelvic fins. There seems to be little justification for placing *C. macropus* in a distinct genus, as has been done by Jordan. There is no doubt that the species described by Bellotti and Gill and Smith are congeneric, and, although the osteology of these fishes has not yet been studied, I feel certain that Regan was right in placing them with the Berycoids.

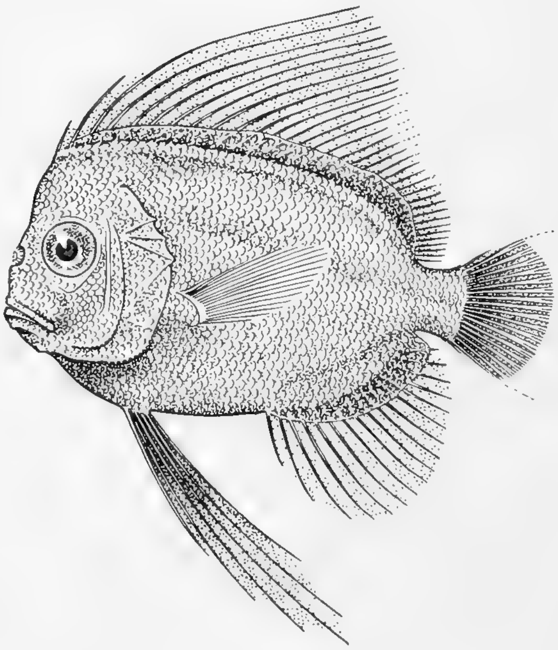

Fig. 37. *Caristius macropus*. (× 1.)

Family MELAMPHAIDAE

Genus **Melamphaes**

I have recently published a revision of this genus, based on the material obtained by the 'Discovery', the specimens in the British Museum collection, including those obtained by the 'Challenger', and a series of authenticated examples of certain species kindly lent to me by the Smithsonian Institution of Washington (1929, *Ann. Mag. Nat. Hist.* Ser. 10, IV, p. 153). A few additional specimens have since come to light, and are duly listed below, together with the remainder of the 'Discovery' material.

Melamphaes typhlops (Lowe, 1843).

Norman, *t.c.* p. 156.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 1 specimen, 26 mm. (?).

Hab. Eastern North Atlantic.

Melamphaes microps (Günther, 1878).

Norman, *t.c.* p. 157.

The following examples, all of small size, seem to belong to this species, which may prove to be identical with *M. typhlops*:—

St. 81. 18. vi. 26. 32° 45′ 00″ S, 8° 47′ 00″ W. 4½ m. net, horizontal, 650 (–0) m.: 1 specimen, 28 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. 4½ m. net, horizontal, 125–175 (–0) m.: 2 specimens, 20–43 mm.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. 70 cm. tow-net, oblique, 124 (–0) m.: 1 specimen, 25 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 4 specimens, 18–31 mm.

Hab. North and South Atlantic; Indian Ocean.

Melamphaes nordenskjoeldii, Lönnberg, 1905.

Norman, *t.c.* p. 159.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 1 specimen, 72 mm.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 6 specimens, 14–80 mm.

St. 256. 23. vi. 27. 35° 14′ 00″ S, 6° 49′ 00″ E. Young-fish trawl, 850–1100 (–0) m.: 12 specimens, 15–28 mm.

Hab. South Atlantic.

Melamphaes robustus, Günther, 1887.

Norman, *t.c.* p. 160.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net, horizontal, 2580 m.: 1 specimen, 65 mm. Do. 1310–1410 m.: 2 specimens, 50–55 mm.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 2 specimens, 20–35 mm.

Hab. North and South Atlantic; Banda Sea (?).

Melamphaes megalops, Lütken, 1877.

Norman, *t.c.* p. 161.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 1 specimen, 50 mm.

St. 267. 23. vii. 27. 24° 31′ 00″ S, 12° 15′ 30″ E. Young-fish trawl, 450–550 m.: 2 specimens, 43–62 mm.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 1 specimen, 60 mm.

St. 296. 26. viii. 27. 8° 12′ 00″ N, 18° 49′ 00″ W. Young-fish trawl, 450–500 (–0) m.: 1 specimen, 30 mm.

St. 298. 29. viii. 27. 13° 01′ 45″ N, 21° 34′ 45″ W. Young-fish trawl, 900–1200 (–0) m.: 2 specimens, 27–32.

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 2 specimens, 65–70 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 1 specimen, 35 mm.

Hab. North and South Atlantic; Indian Ocean.

Melamphaes cristiceps, Gilbert, 1890.

Norman, *t.c.* p. 162.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 1310–1410 m.: 3 specimens, 78–105 mm.

St. 245. 10. vi. 27. 38° 20′ 00″ S, 22° 18′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1800–2000 m.: 1 specimen, 180 mm.

Hab. Atlantic; Pacific coast of North America.

Melamphaes atlanticus, Norman.

Norman, 1929, *t.c.* p. 165.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 2 specimens, 105–110 mm. (The smaller is the holotype.)

St. 151. 16. i. 27. 53° 25′ 00″ S, 35° 15′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1025–1275 m.: 2 specimens, 75–78 mm.

St. 239. 2. vi. 27. 46° 56′ 00″ S, 46° 03′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1050–1350 (–0) m.: 1 specimen, 125 mm.

Hab. South Atlantic; off South Africa.

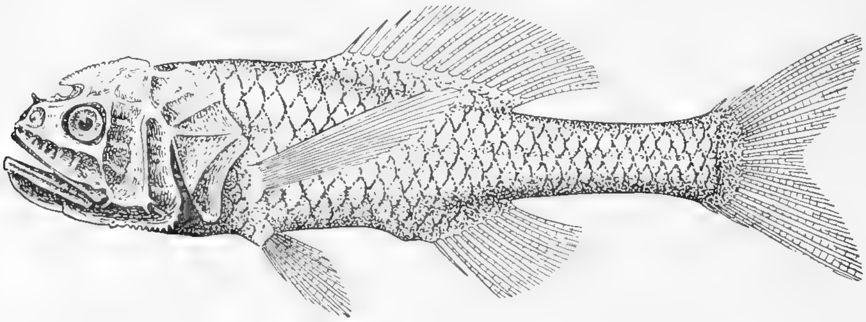

Fig. 38. *Melamphaes atlanticus*. Holotype. (× 1.)

Melamphaes beanii, Günther, 1887.

Norman, *t.c.* p. 166.

St. 78. 12. vi. 26. 35° 18′ 00″ S, 19° 01′ 10″ W. Young-fish trawl, 1000 (–0) m.: 1 specimen, 105 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 2 specimens, 45–70 mm.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 2 specimens, 128–130 mm.

St. 100. 3–4. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. Young-fish trawl, 900–1000 m.: 1 specimen, 125 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 2 specimens, 75–120 mm.

St. 267. 23. vii. 27. 24° 31′ 00″ S, 12° 15′ 30″ E. Young-fish trawl, 450–550 (–0) m.: 2 specimens, 53–115 mm.

St. 269. 26. vii. 27. 15° 55′ 00″ S, 10° 35′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 600–700 m.: 8 specimens, 60–75 mm.

Hab. North and South Atlantic.

Melamphaes mizolepis (Günther, 1878).

Norman, *t.c.* p. 168.

St. 276. 5. viii. 27. 5° 54′ 00″ S, 11° 19′ 00″ E. Young-fish trawl, 150 (–0) m.: 2 specimens, 28–30 mm.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850–950 (–0) m.: 1 specimen, 20 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. 4½ m. net, horizontal, 125–175 (–0) m.: 12 specimens, 35–60 mm.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. 70 cm. tow-net, oblique, 100 (–0) m.: 1 specimen, 12 mm. Young-fish trawl, 250 (–0) m.: 27 specimens, 20–75 mm.

St. 296. 26. viii. 27. 8° 12′ 00″ N, 18° 49′ 00″ W. Young-fish trawl, 450–500 (–0) m.: 2 specimens, 28–30 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 12 specimens, 25–85 mm.

Hab. North and South Atlantic; Indian Ocean and Archipelago; Pacific coast of North America.

Melamphaes sp.

The following specimens are small and poorly preserved, and cannot be identified:—

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 4½ m. net, horizontal, 1000 (–0) m.: 3 specimens, 15–22 mm.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. 4½ m. net, horizontal, 850–950 m.: 4 specimens, 28–38 mm.

St. 245. 10. vi. 27. 38° 20′ 00″ S, 22° 18′ 00″ W. 4½ m. net, horizontal, 1800–2000 m.: 1 specimen, 50 mm.

St. 298. 29. viii. 27. 13° 01′ 45″ N, 21° 34′ 45″ W. Young-fish trawl, 900–1200 (–0) m.: 1 specimen, 24 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 1 specimen, 60 mm.

Caulolepis longidens, Gill, 1884.

Brauer, 1906, '*Valdivia*' *Tiefsee-Fische*, p. 286, pl. xii, fig. 4; Zugmayer, 1911, *Rés. Camp. Sci. Monaco*, xxxv, p. 102, pl. v, fig. 3.

St. 239. 2. vi. 27. 46° 56′ 00″ S, 46° 03′ 00″ W. 4½ m. net, horizontal, 1050–1350 (–0) m.: 3 specimens, 115–150 mm.

Depth of body a little more than twice in the length, length of head $2\frac{4}{5}$ to $3\frac{1}{5}$. Diameter of eye 4 to $4\frac{3}{4}$ in length of head, interorbital width $2\frac{1}{2}$ to $2\frac{2}{3}$. Dorsal III 16–17. Anal II 7–8. Pectoral 15. Pelvic I 6.

Hab. Atlantic; coast of California; Hawaiian Islands.

C. subulidens, Garman, from the Pacific coast of Panama, appears to differ chiefly in the form of the body, more anterior insertion of the pelvics, with a greater distance between them and the anal, and in having the praemaxillary produced posteriorly into a long slender process which extends beyond the broadly rounded hinder end of the maxillary.

Order PERCOMORPHI

Family CHILODIPTERIDAE

Genus **Rhectogramma**, gen. nov.

Body somewhat elevated, covered with firm ctenoid scales of moderate size; head scaled. Mouth oblique; jaws equal anteriorly; maxillary exposed, its hinder end rather broad. A single series of minute villiform teeth in each jaw; no canines; vomer and palatines apparently toothless. Posterior margin of praeoperculum feebly serrated, with one or two stronger spines at the angle; operculum with a group of spines at its upper angle and one or two acute spines near its junction with the suboperculum, which is armed with a similar but shorter spine. Gill-rakers numerous, long, slender, close-set. Pseudobranchiae present. First dorsal with 8 spines, well separated from second dorsal, which has 9 rays. Anal with 3 spines and 7 rays; originating below anterior part of dorsal. Dorsal and anal scaleless, with some fine flexible rods resembling rudimentary rays between the principal rays.[1] Caudal forked. Vent immediately in front of anal fin. Lateral line interrupted; the pores simple.

Genotype. *Rhectogramma sherborni*, n.sp.

This genus appears to be related to *Parasphyraenops*, Bean, and *Parahynnodus*, Barnard. It differs from the former in the form of the maxillary and operculum, and in the separate dorsal fins, and from the latter chiefly in the form of the maxillary and operculum, scaly head, dentition, and interrupted lateral line.

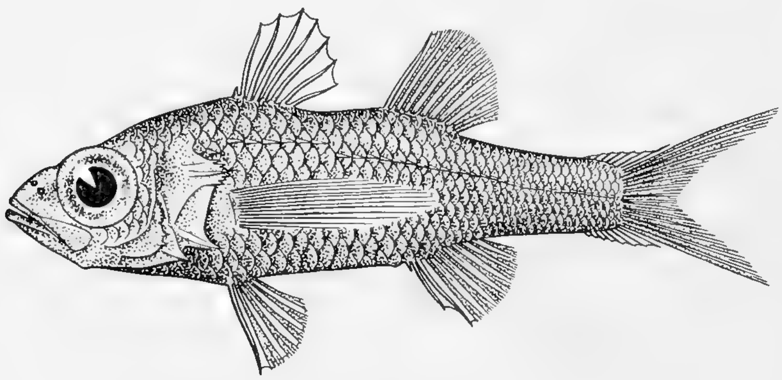

Fig. 39. *Rhectogramma sherborni*. Holotype. (× 1.)

Rhectogramma sherborni, n.sp.

St. 101. 15. x. 26. 33° 50′ to 34° 13′ S, 16° 04′ to 15° 49′ E. $4\frac{1}{2}$ m. net, horizontal, 850–950 m.: 1 specimen, 80 mm. Holotype.

Depth of body $3\frac{1}{4}$ in the length, length of head $2\frac{2}{3}$. Snout much shorter than eye, diameter of which is greater than interorbital width and $2\frac{1}{2}$ in length of head. Maxillary

[1] These structures, which have the appearance of slender rays, extend nearly to the margin in the anterior part of the fin but become much shorter posteriorly.

extending to below anterior half of eye. 22 gill-rakers on lower part of anterior arch. 36 scales in a longitudinal series; 4 between origin of first dorsal and lateral line; 2 + 6 + 27 scales in the lateral line, which is interrupted near its origin and again just behind first dorsal fin. Dorsal VIII + I 9; origin of first dorsal $1\frac{1}{2}$ times as distant from base of caudal as from end of snout; first spine very short; fourth longest, more than $\frac{1}{2}$ length of head. Anal III 7. Pectoral with 14 or 15 rays, about as long as head. Pelvic I 5, below base of pectoral. Dark brownish; head lighter, with silvery reflections.

Described from a single specimen, 80 mm. in length; holotype of the species.

Hab. Off South Africa.

Named in honour of Mr C. D. Sherborn, to whose extensive and unrivalled knowledge of matters of nomenclature the author is greatly indebted, as a slight appreciation of his magnificent work, the *Index Animalium*.

Family CHIASMODONTIDAE

I have given an account of the osteology of this interesting family in a recent paper, together with a systematic revision of the genera, which includes the material obtained by the 'Discovery' (1929, *Ann. Mag. Nat. Hist.* Ser. 10, III, p. 529).

Chiasmodon niger, Johnson, 1863.

Norman, *t.c.* p. 538, fig. 8 *a*.

St. 239. 2. vi. 27. 46° 56′ 00″ S, 46° 03′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1050–1350 (–0) m.: 1 specimen, 60 mm.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. $4\frac{1}{2}$ m. net, horizontal, 125–175 (–0) m.: 1 specimen, 42 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 1 specimen, 58 mm.

Hab. Atlantic; Caribbean Sea; Indian Ocean.

Chiasmodon bolangeri, Osorio.[1]

Osorio, 1909, *Mem. Mus. Bocage*, I, p. 22, pl. ii, fig. 1.

Chiasmodon microcephalus, Norman, *t.c.* p. 539, fig. 8 *b*.

St. 76. 5. vi. 26. 39° 50′ 30″ S, 36° 23′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1500 (–0) m.: 2 specimens, 85–115 mm.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 1 specimen, 48 mm.

Hab. Atlantic.

Dysalotus alcocki, MacGilchrist 1905.

Norman, *t.c.* p. 541, fig. 9.

St. 245. 10. vi. 27. 38° 20′ 00″ S, 28° 18′ 00″ W. $4\frac{1}{2}$ m. net, horizontal, 1800–2000 m.: 1 specimen, 145 mm.

Hab. South Atlantic; Bay of Bengal.

[1] The paper by Osorio, entitled *Contribuição para o conhecimento da Fauna Bathypelagica visinha das Costas de Portugal*, was never included in the *Zoological Record*, and as unknown to me until quite recently.

Dysalotus macrodon, Norman.

Norman, *t.c.* p. 542, fig. 10.

St. 100. 4. x. 26. 33° 20′ 00″ to 33° 46′ 00″ S, 15° 18′ 00″ to 15° 08′ 00″ E. Young-fish trawl, 2500–2000 m.: 1 specimen, 145 mm. (Holotype.)

Hab. South Atlantic.

Pseudoscopelus scriptus, Lütken, 1892.

Norman, *t.c.* p. 543, fig. 11.

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. Young-fish trawl, 250 (–0) m.: 1 specimen, 100 mm.

Hab. Atlantic; Sagami Sea.

Family STROMATEIDAE

Nomeus gronovii (Gmelin, 1788).

Regan, 1902, *Ann. Mag. Nat. Hist.* (7), x, p. 122.

2. xi. 25. 7° 17′ N, 16° 19′ W. Hand net, surface: 8 specimens, 16–40 mm.

Hab. Atlantic and Indo-Pacific.

Cubiceps gracilis (Lowe, 1843).

Regan, *t.c.* p. 123.
Cubiceps lowei, Osorio, 1909, *Mem. Mus. Bocage*, I, p. 14.[1]

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 1000 (–0) m.: 1 specimen, 92 mm.

Hab. Mediterranean; coast of Portugal; Madeira; Cape of Good Hope; South Atlantic.

Comparison of a number of examples from South Africa with Lowe's types shows that *C. capensis* (Smith, 1845) is synonymous with *C. gracilis*.

Psenes cyanophrys, Cuv. and Val., 1833.

Regan, *t.c.* p. 125.

St. 291. 24. viii. 27. 3° 46′ 00″ N, 16° 49′ 00″ W. Young-fish trawl, 100 (–0) m.: 1 specimen 30 mm.

Hab. Atlantic and Indo-Pacific.

Psenes pellucidus, Lütken.

Lütken, 1880, *Spoilia Atlantica*, p. 516, fig. 601; Regan, *t.c.* p. 125.

St. 285. 16. viii. 27. 2° 43′ 30″ S, 00° 56′ 30″ W. $4\frac{1}{2}$ m. net, horizontal, 125–175 (–0) m.: 1 specimen, 36 mm.

Depth of body twice in the length, length of head $3\frac{1}{4}$. Snout shorter than eye, diameter of which is nearly 3 times in length of head and about equal to interorbital width.

[1] See footnote under *Chiasmodon bolangeri* on p. 349.

Maxillary extending to below anterior part of eye. Dorsal X or XI, I 32. Anal III 32. Posterior rays of dorsal and anal fins longest, about $\frac{4}{5}$ length of head. Pectoral nearly as long as head. Pelvic a little longer than head. Pale yellowish and semi-transparent; sides of body and bases of vertical fins with large brown spots; distal parts of vertical fins dusky; pectorals pale, pelvics dusky.

Described from a single specimen, 36 mm. in length.

Hab. Atlantic.

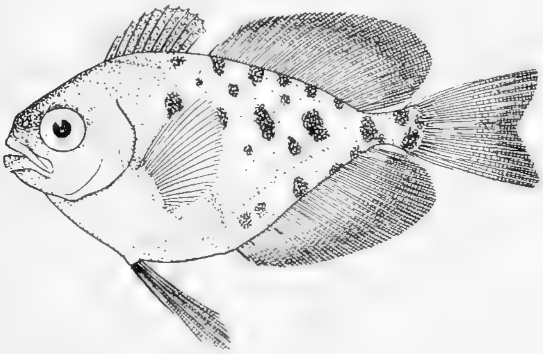

Fig. 40. *Psenes pellucidus.* (× $1\frac{1}{2}$.)

Family GEMPYLIDAE

Nealotus tripes, Johnson.

Johnson, 1865, *Proc. Zool. Soc.* p. 434; Günther, 1887, *Deep-Sea Fish. 'Challenger'*, p. 35; Goode and Bean, 1895, *Ocean. Ichth.* p. 199.

St. 281. 12. viii. 27. 00° 46′ 00″ S, 5° 49′ 15″ E. Young-fish trawl, 850–950 (–0) m.: 1 specimen, 53 mm.
St. 291. 24. viii. 27. 3° 46′ 00″ N, 16° 49′ 00″ W. Young-fish trawl, 100 (–0) m.: 1 specimen, 88 mm.

Depth of body 8 to $8\frac{2}{3}$ in the length, length of head nearly 4. Snout longer than eye, diameter of which is greater than interorbital width and $4\frac{1}{4}$ to $4\frac{1}{2}$ in length of head. Maxillary extending to below anterior part of eye; lower jaw strongly projecting. A single series of small teeth of varying sizes in both jaws; three pairs of strong canines

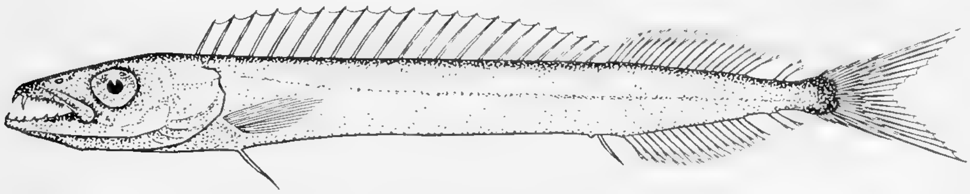

Fig. 41. *Nealotus tripes.* (× $1\frac{1}{4}$.)

anteriorly in upper jaw and a single pair of much smaller ones at symphysis of lower jaw. Dorsal XX–XXI, 17–19 + 2. Anal 15–16 + 2. Pectoral about $\frac{1}{2}$ length of head. Pelvic represented by a single spine, equal in length to diameter of eye, and rather longer than the dagger-shaped spine behind the vent.

Described from two specimens, 53 and 88 mm. in length.

Hab. Atlantic.

Order SCLEROPAREI

Family LIPARIDAE

Paraliparis gracilis, n.sp.

St. 146. 8. i. 27. 53° 48′ 00″ S, 35° 37′ 30″ W. Large dredge, heavy pattern, 4 ft. in length (1·2 m.), 728 m.: rock. 1 specimen, 70 mm. Holotype.

Depth of body equal to length of head and $5\frac{1}{3}$ in length of fish. Snout rather obtuse, scarcely projecting beyond mouth, shorter than eye, diameter of which is about $\frac{1}{3}$ of head. Maxillary extending to below posterior part of eye; teeth villiform, in broad bands. Lower end of gill-opening opposite upper pectoral rays. Dorsal with about 59 rays; origin above extremity of operculum; first four rays very short and partially hidden beneath the skin. Anal with about 56 rays; origin below about tenth ray of dorsal. Pectoral with $10+1+1+1+3$ rays; longest rays of upper portion about equal to those of lower and as long as head; upper and lower portions separated by three single rays set wide apart.

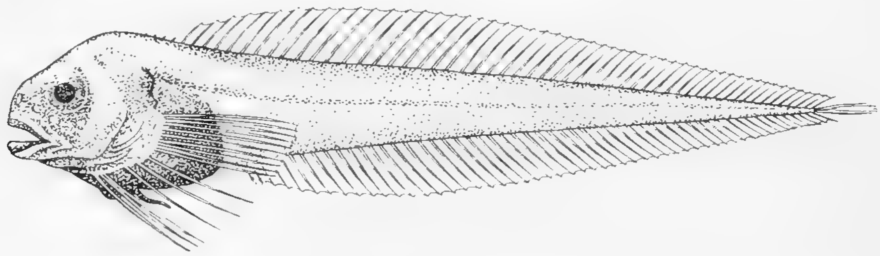

Fig. 42. *Paraliparis gracilis*. Holotype. (× $1\frac{1}{2}$.)

Described from a single specimen, 70 mm. in length; holotype of the species.

Hab. North of South Georgia.

Very close to *P. terrae-novae*, Regan, which was described from a single young specimen, 35 mm. in length, from McMurdo Sound. It appears to differ in the greater number of anal rays and in the form of the pectoral fin. The three Antarctic species may be distinguished as follows.

I. Upper portion of pectoral with 19 rays. 1. *antarcticus*, Regan, 1914

II. Upper portion of pectoral with about 10 rays.

A. Anal with 43 rays; pectoral fin without elongate lower rays. 2. *terrae-novae*, Regan, 1916

B. Anal with about 56 rays; pectoral with 3 elongate lower rays. 3. *gracilis*, n.sp.

Order PEDICULATI

Family LINOPHRYNIDAE

Haplophryne mollis (Brauer, 1902).

Regan, 1926, *Ocean. Rep. Danish 'Dana'-Exped.* (1920–2), II, p. 25, pl. iii, fig. 3.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 1 specimen, 40 mm.

Hab. Atlantic; Indian Ocean; New Zealand.

Family ONEIRODIDAE

Dolopichthys heteracanthus, Regan, 1925.

Regan, 1926, *t.c.* p. 28, pl. v, fig. 1.

28. x. 25. 13° 25′ N, 18° 22′ W. $4\frac{1}{2}$ m. net, horizontal, 900 (–0) m.: 2 specimens, 28–50 mm.

Hab. North Atlantic; Gulf of Panama.

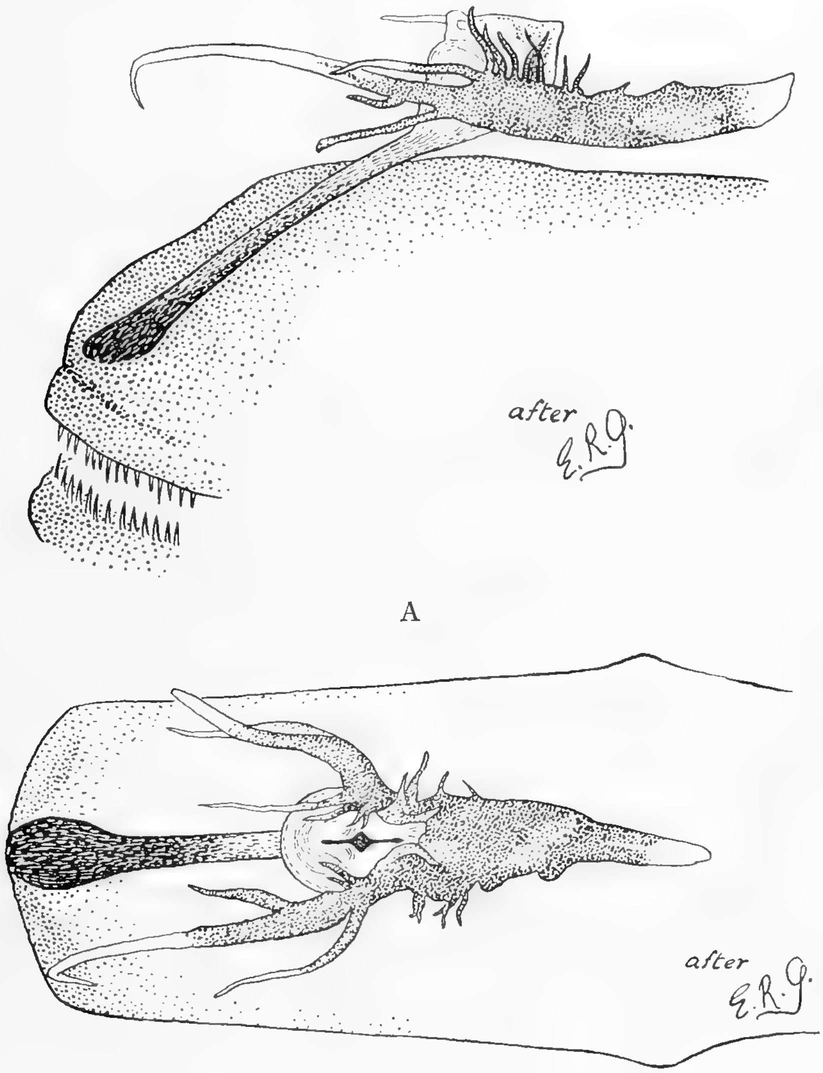

Fig. 43. Distal end of the illicium of *Dolopichthys allector*. A. Lateral view. B. Dorsal view. (× 8.) From sketches made by Mr E. R. Gunther.

Dolopichthys allector, Garman, 1899.

Regan, *t.c.* p. 28.

St. 297. 28. viii. 27. 12° 08′ 00″ N, 20° 53′ 30″ W. Young-fish trawl, 250–300 (–0) m.: 1 specimen, 36 mm.

Hab. North Atlantic; Gulf of Panama.

The structure of the bulb of the illicium of this specimen seems to be a little different to that of *D. allector*, but in the absence of more data as to the variability of these structures, and as I have been unable to detect any other differences, I have hesitated to describe a new species on the basis of a single small specimen. According to a note made by Mr E. R. Gunther on the fresh specimen, the bulb is silvery in colour with a tinge of blue, slightly speckled with light brown. This is surmounted by a silvery organ, perhaps connected with the production of light, which in turn bears a transparent membranous process pigmented at its base. The Y-shaped appendage attached to and almost embracing the bulb and silvery organ is reddish brown in colour, and is fringed by membranous processes of varying length, the distal ends of which are devoid of colour and nearly transparent.

Dolopichthys longicornis, Parr.

Parr, 1927, *Bull. Bingham Ocean. Coll.* III (1), p. 18, fig. 6.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 1 specimen, 35 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 1 specimen, 30 mm.

Hab. Atlantic; West Indies.

Lophodolus acanthognathus, Regan, 1925.

Regan, 1926, *t.c.* p. 30, pl. vi, fig. 1.

St. 287. 19. viii. 27. 2° 49′ 30″ S, 9° 25′ 30″ W. Young-fish trawl, 800–1000 (–0) m.: 1 specimen, 23 mm.

Hab. Atlantic.

Family MELANOCETIDAE

Melanocetus johnsoni, Günther, 1864.

Regan, *t.c.* p. 33.

St. 269. 26 vii. 27. 15° 55′ 00″ S, 10° 35′ 00″ E. Young-fish trawl, 600–700 (–0) m.: 8 specimens, 25–73 mm.

St. 270. 27. vii. 27. 13° 58′ 30″ S, 11° 43′ 30″ E. Young-fish trawl, 200 (–0) m.: 1 specimen, 35 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. 4½ m. net, horizontal, 900 (–0) m.: 2 specimens, 26–30 mm.

Hab. Atlantic; Indian Ocean (?).

Family CERATIIDAE

Cryptosparas couesii, Gill, 1883.

Regan, *t.c.* p. 35, pl. ix, fig. 2.

St. 87. 25. vi. 26. 33° 53′ 45″ S, 9° 26′ 30″ E. Young-fish trawl, 1000 (–0) m.: 1 specimen, 65 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. $4\frac{1}{2}$ m. net, horizontal, 900 (–0) m.: 1 specimen 15 mm.

11. xi. 25. 6° 55′ N, 15° 54′ W. 2 m. tow-net, horizontal, 800 (–0) m.: 1 specimen, 17 mm.

Hab. Atlantic; Gulf of Aden; Gulf of Panama.

The specimen from St. 87 was examined alive on board the 'Discovery'. It was observed continually to beat the water with the pectoral fins, suggesting that this action was in some way connected with respiration. When the water was churned, as by pouring in more salt water, or when the illicium was stroked, the luminous distal end emitted a greenish blue light for half a minute or so. This phenomenon was noted three times. Definite projections of the skin in the form of very fine black papillae were noted in six places on each side of the body: three on each side of the lower jaw; one on each side of the head between the nostril and the base of the illicium; and a pair on each side of the back at the middle of the body. The position of these papillae is indicated in the accompanying figure.

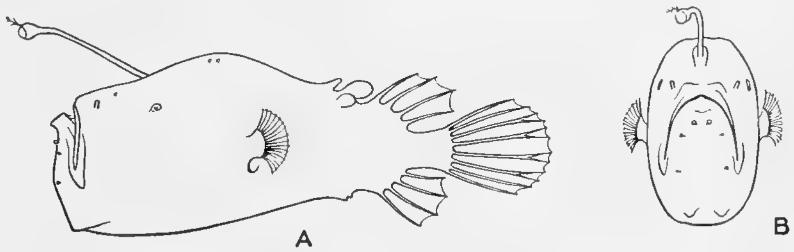

Fig. 44. Outline drawings of *Cryptosparas couesii*, showing the position of the papillae in the skin. A. Lateral view. B. Front view. (× 1.)

Mancalias uranoscopus (Günther, 1878).

Regan, *t.c.* p. 37, text-fig. 21.

St. 293. 24. viii. 27. 4° 18′ 15″ N, 16° 51′ 00″ W. Young-fish trawl, 100–120 (–0) m.: 2 specimens, 28–30 mm.

28. x. 25. 13° 25′ N, 18° 22′ W. $4\frac{1}{2}$ m. net, horizontal, 900 (–0) m.: 1 specimen, 70 mm.

Hab. Atlantic; Hawaiian Islands.

Mancalias tentaculatus, n.sp.

St. 114. 12. xi. 26. 52° 25′ 00″ S, 9° 50′ 00″ E. $4\frac{1}{2}$ m. net, horizontal, 650–700 m.: 1 specimen, 110 mm. (Holotype.)

Closely related to *M. uranoscopus*. Basal bone of illicium a little more than $\frac{1}{4}$ length of fish (without caudal), and little longer than the illicium itself; bulb pigmented proximally, pale yellowish white distally; at the tip of the bulb is a very small brown ring, close to which are two small and almost transparent tentacles. In front of the pair of stalked caruncles is a stout ray, which is nearly as long as the distance from the caruncles to the upper ray of caudal fin, and about $3\frac{1}{2}$ in length of fish.

Described from a single specimen, 110 mm. in length; holotype of the species.

Hab. South Atlantic.

In 1908 Tanaka described a somewhat similar fish, 440 mm. in total length, from

Japan, under the name of *Paraceratias mitsukurii*, and Regan has shown that apart from the presence of the tentacle-like ray in front of the caruncles this is exactly similar to *Cryptosparas couesii*. Another fish from Japan described by Günther as *Ceratias carunculatus*, which was 35 mm. in length, has this ray represented by a slight prominence, under which is a gland with a pore, but likewise resembles *Cryptosparas couesii* in other characters. It is of some interest to find a species with this ray on the back occurring in both genera.

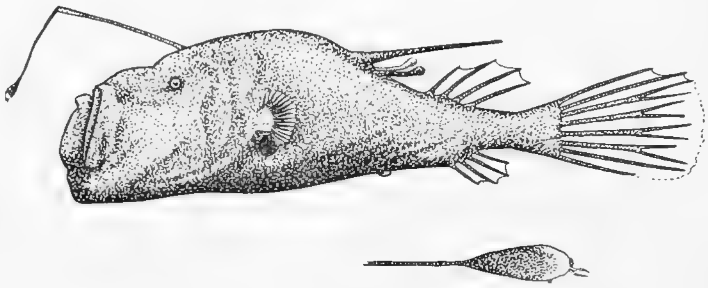

Fig. 45. *Mancalias tentaculatus*. Holotype. (× $\frac{3}{4}$.) [Distal portion of illicium × 3.]

Family HIMANTOLOPHIDAE

Genus **Paroneirodes**, Alcock, 1890

Regan, who had not seen Alcock's specimen, united this genus with *Diceratias*, but it may be distinguished by the smooth skin, feeble teeth, and more backward position of the illicium, which arises between the sphenotics.

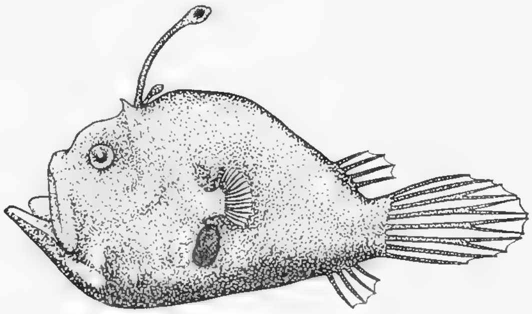

Fig. 46. *Paroneirodes glomerosus*. (× $2\frac{1}{2}$.)

Paroneirodes glomerosus, Alcock.

Alcock, 1890, *Ann. Mag. Nat. Hist.* (6), vi, p. 206, pl. ix, fig. 6.

Oneirodes glomerosus, Alcock, 1899, *Cat. Indian Deep-Sea Fish.* p. 57; 1900, *Illust. Zool.* '*Investigator*', *Fishes*, pl. xxviii, fig. 4.

Diceratias glomerulosus, Regan, 1926, *t.c.* p. 42.

St. 269. 26. vii. 27. 15° 55′ 00″ S, 10° 35′ 00″ E. Young-fish trawl, 600–700 (–0) m.: 1 specimen, 26 mm.

Illicium about $\frac{1}{3}$ length of fish, more than four times as long as the ray behind it; terminal bulb without filaments. Dorsal 6. Anal 4. Caudal 8 (?).

Described from two specimens, 26 to 28 mm. in length, including the type of the species lent to me by the Indian Museum[1].

Hab. South Atlantic; Indian Ocean (Bay of Bengal).

Family ACERATIIDAE

Lipactis tumidus, Regan, 1925.

Regan, 1926, *t.c.* p. 43, pl. xii, fig. 2.

St. 298. 29. viii. 27. 13° 01′ 45″ N, 21° 34′ 45″ W. Young-fish trawl, 900–1200 (–0) m.: 1 specimen, 13 mm.

Hab. North Atlantic.

Rhynchoceratias brevirostris, Regan, 1925.

Regan, 1926, *t.c.* p. 43, pl. xiii, fig. 1, text-fig. 25 *a*.

St. 298. 29. viii. 27. 13° 01′ 45″ N, 21° 34′ 45″ W. Young-fish trawl, 900–1200 (–0) m.: 1 specimen, 40 mm.

[1] This specimen is poorly preserved, and the ray behind the illicium has been torn away from the skin, thus appearing somewhat longer at first sight.

PART II. FLATFISHES

INTRODUCTION

THE collection of Flatfishes made by the R.R.S. 'Discovery' and R.R.S. 'William Scoresby' includes examples of nine species, and, although of small size, is of considerable interest. It includes a single specimen of a genus and species apparently new to science. With the sole exception of one specimen of *Heteromycteris capensis*, the collection was made either in the Magellan-Falkland Islands region or off the coast of West Africa.

My thanks are due to the members of the Discovery Committee for permission to examine this material, and are gratefully tendered. The figure of *Achiropsetta tricholepis* has been drawn by Lieut.-Col. W. P. C. Tenison, D.S.O.

SYSTEMATIC ACCOUNT

Order HETEROSOMATA

Family BOTHIDAE

Genus **Thysanopsetta**, Günther

Günther, 1880, *Shore Fishes 'Challenger'*, p. 22.

Thysanopsetta naresi, Günther.

Günther, 1880, *t.c.* p. 22, pl. xi, fig. A.

St. 51. 4. v. 26. Off Eddystone Rock, East Falkland Islands. From 7 miles N 50° E to 7·6 miles N 63° E of Eddystone Rock. Large otter trawl, 105–115 m.: fine sand. 2 specimens, 100–127 mm.

St. WS 77. 12. iii. 27. 51° 01′ 00″ S, 66° 31′ 30″ W. Commercial otter trawl, 110–113 m.: coarse dark sand. 4 specimens, 38–115 mm.

St. WS 90. 7. iv. 27. 13 miles N 83° E of Cape Virgins Light, Argentine Republic. Commercial otter trawl, 82–81 m.: fine dark sand. 5 specimens, 63–132 mm.

St. WS 91. 8. iv. 27. 52° 53′ 45″ S, 64° 37′ 30″ W. Commercial otter trawl, 191–205 m.: fine dark sand and shells. 1 specimen, 44 mm.

St. WS 92. 8. iv. 27. 51° 58′ 30″ S, 65° 01′ 00″ W. Commercial otter trawl, 145–143 m.: fine dark sand and stones. 2 specimens, 41–61 mm.

St. WS 96. 17. iv. 27. 48° 00′ 45″ S, 64° 58′ 00″ W. Commercial otter trawl, 96 m.: fine dark sand. 35 specimens, 34–80 mm. [Taken from stomach of *Merluccius*.]

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. Commercial otter trawl, 146–145 m.: sand, gravel and stones. 1 specimen, 83 mm.

St. WS 216. 1. vi. 28. 47° 37′ 00″ S, 60° 50′ 00″ W. Net attached to back of trawl, 219–133 m.: fine sand. 1 specimen, 142 mm.

St. WS 219. 3. vi. 28. 47° 06′ 00″ S, 62° 12′ 00″ W. Tow-net attached to back of trawl, 116–114 m.: dark sand. 2 specimens, 70–75 mm.

St. WS 222. 8. vi. 28. 47° 23′ 00″ S, 65° 00′ 00″ W. Tow-net attached to back of trawl, 100–106 m.: coarse brown sand and shells. 5 specimens, 37–45 mm.

Depth of body $2\frac{1}{3}$ to $2\frac{1}{2}$ in the length, length of head 4 to 5. Upper profile of head generally a little notched in front of eyes. Snout shorter than eye, diameter of which is 3 to $3\frac{1}{2}$ in length of head and more than twice the width of the flat, scaly interorbital space; upper eye a little in advance of lower and close to edge of head. Jaws and dentition about equally developed on both sides; the maxillary extending to below middle of eye or not quite as far, length a little more than 2 in that of head; lower jaw scarcely projecting, its length $1\frac{2}{3}$ to nearly 2 in head; rather broad bands of small conical teeth in both jaws. Margin of gill-cover fringed; gill-rakers long, slender, 20 to 23 on lower part of anterior arch. Scales small, ctenoid on both sides of body; 67 to 72 in lateral line. Dorsal 84–90; origin above nostrils of blind side and just in front of upper eye; all the rays simple, not scaled. Anal 61–66; first interhaemal spine not projecting. Pectoral of ocular side with 9 or 10 simple rays, length about $\frac{1}{2}$ that of head; that of blind side shorter. Pelvics with 6 rays; short-based, subequal and nearly symmetrical. Caudal with 15 simple rays, rounded; caudal peduncle short. Brownish or greyish, mottled and spotted with darker, and with small dark dots forming irregular lines running along the body between the series of scales; all the rays of the fins finely dotted with brown or black.

Described from several specimens, up to 175 mm. in total length, including the holotype of the species.

Hab. Magellan-Falkland Islands region.

Genus **Eucitharus**, Gill

Citharus (*non* Reinhardt, 1838), Bleeker, 1862, *Versl. Akad. Amsterdam*, XIII, p. 424.
Eucitharus, Gill, 1889, *Proc. U.S. Nat. Mus.* XI, p. 600.

Eucitharus linguatula (Linnaeus).

Pleuronectes linguatula, Linnaeus, 1758, *Syst. Nat.* ed. 10, p. 270.
Citharus linguatula, Günther, 1862, *Cat. Fish*, IV, p. 418.
Eucitharus linguatula, Carus, 1889–93, *Prodr. Faun. Medit.* II, p. 588.

St. 272. 30. vii. 27. Off Elephant Bay, Angola; from 13° 11′ S, 12° 44′ 45″ E to 13° 09′ 45″ S, 12° 46′ E. Large otter trawl, 73–97 m.: green sand and mud. 3 specimens, 200–212 mm.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola; from 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. Large otter trawl, 64–65 m.: grey mud. 4 specimens, 28–80 mm.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo; from 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. Large otter trawl, 58–67 m.: mud and fine sand. 2 specimens, 140–170 mm.

Depth of body $2\frac{1}{2}$ to $2\frac{3}{4}$ in the length, length of head 3 to $3\frac{1}{4}$. Upper profile of head distinctly concave. Snout a little longer than eye, diameter of which is 5 to $5\frac{2}{3}$ in length

of head; eyes separated by a low bony ridge, the upper a little in advance of lower and very close to edge of head. Posterior nostril a large opening, that of blind side covered by a membranous valve which extends downwards towards the mouth. Maxillary extending to below posterior edge of eye or not quite as far, length about $\frac{1}{2}$ head; lower jaw strongly projecting, its length $1\frac{2}{3}$ to $1\frac{3}{4}$ in that of head; a shallow emargination at its anterior end receives a corresponding prominence on the upper jaw; praemaxillary with an outer series of rather strong teeth, inside which are one or two large canines; maxillary with a single series of smaller teeth; mandibulary teeth uniserial, somewhat enlarged anteriorly; two or three strong teeth on the vomer. Gill-rakers of moderate length and rather slender, 11 or 12 on lower part of anterior arch. Scales rather large, thin, deciduous, more or less ctenoid on both sides of body; 35 to 39 scales in the lateral line. Lateral line well developed on both sides of body, with a strong curve above the pectoral fin; continued to posterior edge of caudal fin; the tubules simple. Dorsal 64–72; origin immediately behind lower part of posterior nostril on blind side of head and just in front of eye; nearly all the rays branched, not scaled. Anal 44–48; tip of first interhaemal spine not projecting. Pectoral fin of ocular side with 10 rays (7 branched), length a little more than $\frac{1}{2}$ that of head; that of blind side shorter. Pelvics with 6 rays; short-based, subequal, that of ocular side situated on median line of body. Caudal with 2/15/2 rays; double-truncate; caudal peduncle $1\frac{2}{3}$ times as deep as long. Greyish or yellowish brown; a black spot at base of last rays of dorsal fin and a similar spot above posterior end of anal; a row of round black spots on dorsal and anal fins.

Described from several specimens, 28 to 170 mm. in total length.

Hab. Mediterranean; West Africa.

This species, which does not appear to have been adequately described before, has not been previously recorded from the coast of West Africa.

Genus **Arnoglossus**, Bleeker

Bleeker, 1862, *Versl. Akad. Amsterdam*, XIII, p. 427.

Arnoglossus imperialis (Rafinesque).

Bothus imperialis, Rafinesque, 1810, Car. n.gen., p. 23.
Arnoglossus imperialis, Kyle, 1913, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 1, p. 79, fig. 10.

St. 272. 30. vii. 27. Off Elephant Bay, Angola; from 13° 11′ S, 12° 44′ 45″ E to 13° 09′ 45″ S, 12° 46″ E. Large otter trawl, 73–97 m.: green sand and mud. 1 specimen, 80 mm.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola; from 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. Large otter trawl, 64–65 m.: grey mud. 1 specimen, 75 m.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo; from 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. Large otter trawl, 58–67 m.: mud and fine sand. 1 specimen, 90 mm.

All these specimens are rather small and in poor condition, but appear to belong to this species. The most southerly point from which it has been previously recorded is south of the Azores ('Hirondelle').

Genus **Lepidopsetta**, Günther

Günther, 1880, *Shore Fishes 'Challenger'*, p. 18.

Lepidopsetta maculata, Günther.

Günther, 1880, *t.c.* p. 18, pl. xxx, fig. C.

St. WS 218. 2. vi. 28. 45° 45′ 00″ S, 59° 35′ 00″ W. Commercial otter trawl, 311–247 m.: dark sand. 1 specimen, 238 mm.

Depth of body $2\frac{1}{8}$ to $2\frac{1}{5}$ in the length, length of head about $3\frac{4}{5}$. Upper profile of head a little notched in front of eyes. Snout shorter than eye, diameter of which is 3 to $3\frac{1}{4}$ in length of head; eyes separated by a very narrow scaly space, the lower in advance of upper, which is close to edge of head; upper parts of both eyes densely scaled. Jaws about equally developed on both sides; the maxillary extending to below anterior part of eye, length $\frac{1}{3}$ or more than $\frac{1}{3}$ that of head; lower jaw not projecting, its length about 2 in head; teeth more developed on blind side; small, conical, uniserial in both jaws; no teeth on the vomer. Gill-rakers rather short and stout, about 12 on lower part of anterior arch. Scales ctenoid on both sides of body, 114 to 120 in lateral line. Lateral line well developed on both sides of body, nearly straight. Dorsal 118–119; origin behind posterior nostril of blind side and just in front of eye; highest rays about $\frac{1}{3}$ length of head. Anal 97–98; tip of first interhaemal spine not projecting. No pectorals. Pelvic fin of ocular side with 7 rays, elongate, situated on median line of body; that of blind side with 5 rays, short-based, lateral in position, its first ray opposite to fourth of right pelvic; both pelvic fins free from anal. Caudal with 2/15/2 rays, rounded; caudal peduncle very short. Brownish; head, body and fins covered with irregular rounded darker spots and blotches.

Described from two specimens, 134 and 238 mm. in total length, the smaller being the holotype of the species.

Hab. Near Prince Edward's Island; South Atlantic, north of the Falkland Islands.

Genus **Achiropsetta**, gen. nov.

Body rather elongate; the middle portion fairly thick and muscular, continued above and below as a thin, semi-transparent region containing the supports of the fins. Eyes on the left side, separated by a flat scaly space. Mouth rather small; jaws and dentition about equally developed on both sides; teeth very small, pointed, not enlarged anteriorly; apparently uniserial in both jaws; palate toothless. Gill-rakers short and stout. Dorsal fin commencing above posterior nostril of blind side and in advance of upper eye; all the rays simple and scaled on both sides; dorsal and anal ending very close to base of caudal. No pectorals. Pelvic fin of ocular side elongate, median anteriorly, twisted on to left side of body posteriorly; that of blind side with shorter base, lateral. Scales very small, ctenoid, the long spinules directed vertically, giving the skin a pilose appearance; upper surfaces of both eyes densely scaled. Lateral line well developed on both sides of body, nearly straight.

Genotype: *Achiropsetta tricholepis*, n.sp.

Apparently related to *Lepidopsetta*, differing chiefly in the form of the body and the structure of the scales.

Achiropsetta tricholepis, n.sp.

St. WS 89. 7. iv. 27. 9 miles N 21° E of Arenas Point Light, Tierra del Fuego; from 53° 01′ 00″ S, 68° 07′ 00″ W to 52° 59′ 30″ S, 68° 06′ 00″ W. Commercial otter trawl, 23–21 m.: mud, gravel and stones. 1 specimen, 100 mm. Holotype.

Depth of body $2\frac{1}{3}$ in the length, length of head $4\frac{1}{2}$. Upper profile of head evenly convex. Snout shorter than eye, diameter of which is about $3\frac{1}{2}$ in length of head and 3 times the interorbital width; lower eye in advance of upper, which is rather close to edge of head. Maxillary extending to below anterior part of eye, length a little more

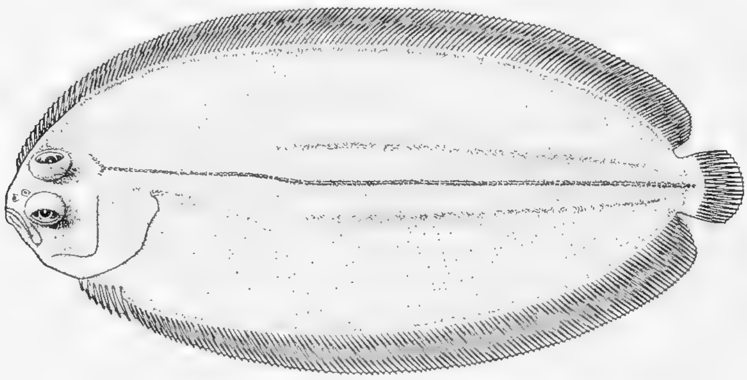

Fig. 47. *Achiropsetta tricholepis*. Holotype. (Nat. size.)

than $\frac{1}{3}$ that of head; lower jaw scarcely projecting, its length nearly $\frac{1}{2}$ head. Upper angle of gill-opening below commencement of lateral line, level with centre of interorbital space; 9 or 10 gill-rakers on lower part of anterior arch. Dorsal about 130; highest rays less than $\frac{1}{2}$ length of head. Anal 114. Pelvic fin of ocular side with 7 rays, that of blind side with 6. Caudal with 18 rays, rounded. Uniformly yellowish brown.

Described from a single specimen, 100 mm. in total length; holotype of the species.

Hab. Off Tierra del Fuego.

Genus **Bothus**, Rafinesque

Rafinesque, 1810, Car. n.gen., p. 23.

Bothus podas (Delaroche).

Pleuronectes podas, Delaroche, 1809, *Ann. Mus. H.N.* (Paris), XIII (77), p. 354.
Bothus podas, Kyle, 1913, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 1, p. 100, fig. 17.

St. 271. 29. vii. 27. Elephant Bay, Angola. Seine net, 5–0 m.: 3 specimens, 55–73 mm.

St. 299. 4. ix. 27. Tarrafal, S. Antonio, Cape Verde Islands. Medium rectangular net, 7–11 m.: 1 specimen, 38 mm.

Hab. Mediterranean; Eastern Atlantic, southwards to Angola.

Family SOLEIDAE

Genus **Solea**, Quensel

Quensel, 1806, *Vet. Akad. Handl.* XXVII, p. 229.

Solea (Dicologlossa) chirophthalmus, Regan.

Solea chirophthalmus, Regan, 1915, *Ann. Mag. Nat. Hist.* (8) XV, p. 129.
Dicologlossa chirophthalmus, Chabanaud, 1927, *Bull. Inst. Océan. Monaco*, 488, p. 28.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola; from 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. Large otter trawl, 64–65 m.: grey mud. 2 specimens, 145–210 mm.

Hab. West Africa.

Known previously only from the types (170–200 mm.) from Lagos.

Genus **Heteromycteris**, Kaup

Kaup, 1858, *Arch. Naturg.* XXIV, 1, p. 103.

Heteromycteris capensis, Kaup.

Kaup, 1858, *t.c.* p. 103; Chabanaud, 1927, *Ann. Mag. Nat. Hist.* (9) XX, p. 525.

St. 91. 8. ix. 26. 0·5 mile off Roman Rock, False Bay, South Africa. Large rectangular net, 35 m.: sand. 1 specimen, 104 mm.

Hab. South Africa.

Family CYNOGLOSSIDAE

Genus **Symphurus**, Rafinesque

Rafinesque, 1810, *Indice Itt. Sicil.* pp. 13, 52.

Symphurus nigrescens, Rafinesque.

Rafinesque, *t.c.* pp. 13, 52.

Plagusia lactea, Bonaparte, 1833, *Icon. Faun. Ital.* (5).
Symphurus lactea, Kyle, 1913, *Rep. Danish Ocean. Exped.* 1908–10, II, A, 1, p. 130, fig. 23.

St. 274. 4. viii. 27. Off St Paul de Loanda, Angola; from 8° 40′ 15″ S, 13° 13′ 45″ E to 8° 38′ 15″ S, 13° 13′ 00″ E. Large otter trawl, 64–65 m.: grey mud. 6 specimens, 23–77 mm.

St. 279. 10. viii. 27. Off Cape Lopez, French Congo; from 8·5 miles N 71° E to 15 miles N 24° E of Cape Lopez Light. Large otter trawl, 58–67 m.: mud and fine sand. 7 specimens, 62–90 mm.

Hab. Mediterranean; West Africa.

These small specimens appear to be identical with the species originally described from the Mediterranean, but I have no material from the latter locality for comparison. It has been recorded from the Bay of Biscay and from near the Azores.

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Range of colour in photophores of oceanic fishes.
From sketches made during life by Mr E. R. Gunther.

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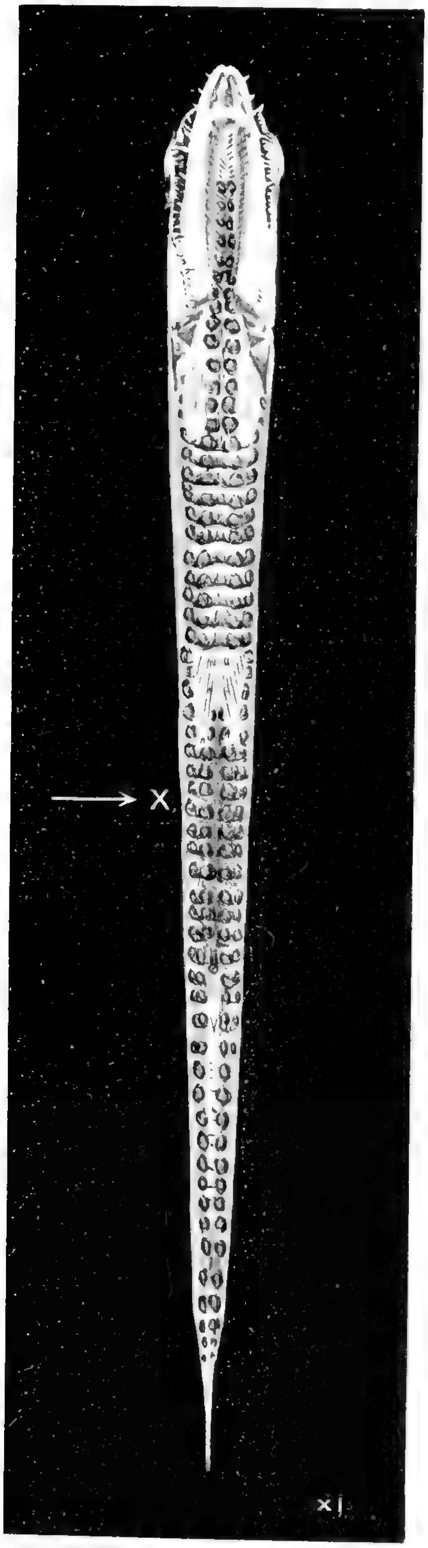
Fig. 3. *Bathytroctes rostratus*. Ventral view showing distribution and red colour of photophores (damaged photophores appear white). The body colour is black.

Fig. 4. *Argyropelecus hemigymnus*. Ventral view to show distribution of photophores. The violet coloration is attributed to a diffraction effect.



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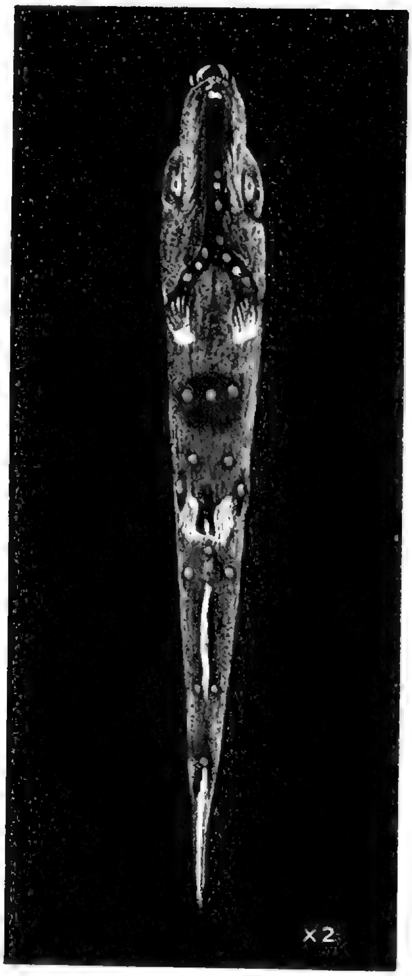

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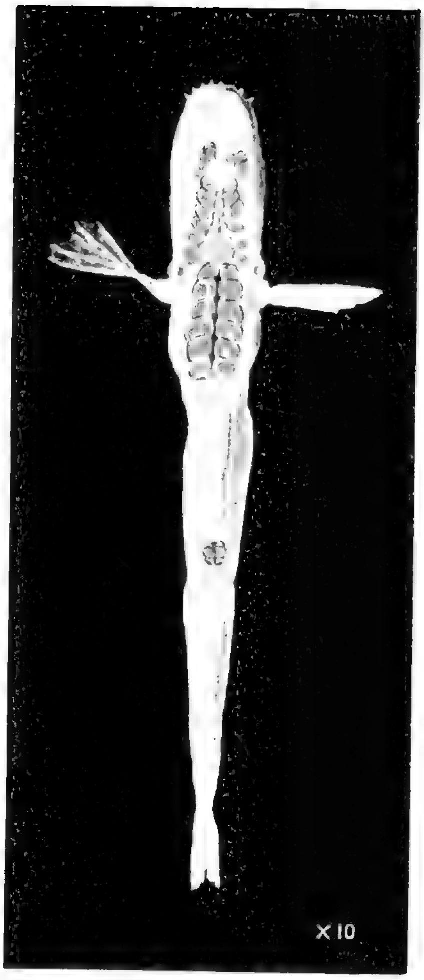

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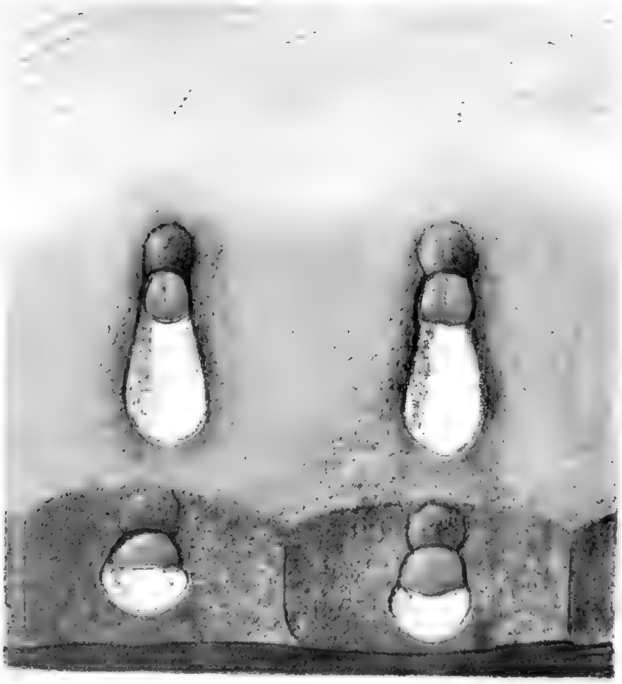

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OCEANIC FISHES

PRINTED
IN GREAT BRITAIN
BY
WALTER LEWIS MA
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THE CAMBRIDGE
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PRESS

DISCOVERY REPORTS

Vol. II, pp. 371–402, plates III and IV, text-figs. 1–18

Issued by the Discovery Committee, Colonial Office, London
on behalf of the Government of the Dependencies of the Falkland Islands

CEPHALOPODA, I. OCTOPODA

by

G. C. Robson, M.A.

CAMBRIDGE
AT THE UNIVERSITY PRESS
1930

Price three shillings net

Cambridge University Press
Fetter Lane, London

New York
Bombay, Calcutta, Madras
Toronto
Macmillan

Tokyo
Maruzen Company, Ltd

[*Discovery Reports. Vol. II, pp.* 371–402, *Plates III and IV, text-figs.* 1–18, *November,* 1930.]

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By

G. C. ROBSON, M.A.

CONTENTS

CEPHALOPODA, I. OCTOPODA

By G. C. Robson, M.A.[1]

(Plates III and IV, text-figs. 1–18)

INTRODUCTION

The Octopoda obtained by the 'Discovery' form a rich and important collection. Fifty-nine specimens were obtained, representing fourteen species. Of these the majority were taken in sub-Antarctic or Antarctic waters, the collection being the richest ever obtained in these latitudes.

The series is of more than ordinary interest from the systematic and distributional point of view. The chief items of interest may be presented under two heads.

1. The expedition obtained a number of rare pelagic Octopods belonging to various families. The most important of these are a single male of a new species of *Vitreledonella*, and one specimen each of the rare genera *Alloposus* and *Amphitretus*, both constituting the types of new species. A new and remarkable species of *Cirroteuthis* was obtained, for which a separate genus may ultimately be required.

2. Perhaps the most valuable outcome of this study is the flood of light cast on the genus *Eledone* by the plentiful supply of specimens which were obtained by the expedition. No less than forty-three specimens of this characteristic Antarctic group were obtained, representing four species. Two of these species are new, and for one of these a new genus is created.

The study of these forms confirms me in the belief that the Antarctic is, as Berry (1917, p. 13) suggested, the metropolis of this group. It is absent from nearly the whole of the Indo-Pacific and Aleutian regions, and is rather sparsely represented in North Atlantic waters.

Naef has questioned whether the genus as known to him might not be polyphyletic. Study of the Discovery material and a re-examination of the types of Hoyle's 'Challenger' species has rendered it most probable that Naef's suggestion is correct. The Mediterranean and Antarctic forms are shown to be radically dissimilar in several important characters, and it seems more likely that the single row of suckers (the only common feature[2]) has been acquired independently on two or more occasions. Furthermore, the group of sub-Antarctic and Antarctic forms is not homogeneous. *Graneledone* (represented by *G. charcoti*, etc.) is very distinct from *Thaumeledone* and *Eledone rotunda* from further afield but possibly having a sub-Antarctic range. Berry's *E. challengeri* (Kermadec Is.) (= "*verrucosa*," Hoyle, 1886) seems to require recognition in a separate genus on account of its archaic radula. *Thaumeledone* and *Eledone rotunda* both

[1] Published by permission of the Trustees of the British Museum.

[2] It is not yet certain how many species of *Eledone* share with *E. cirrosa* and *moschata* the characteristic of depositing large eggs.

lack ink-sacs (as in the Bathypolypodinae). At present it is impossible to say whether the Bathypolypodinae are a natural group and whether *Thaumeledone* and its fellow are Bathypolypods that have independently acquired a single row of suckers, or whether (as I am strongly inclined to suspect) the Octopodidae are in a very active evolutionary stage (Robson, 1929, p. 4), out of which large and natural subdivisions have not yet been evolved and stabilised, so that the ink-sac has been lost and the suckers have become uniserial on more than one occasion. These are highly interesting matters which I hope to discuss at fuller length in a subsequent publication.

One of the most interesting phenomena that have been revealed from the study of the Discovery material is the degeneration of the radula of *Thaumeledone gunteri*. Other forms were examined, and a similar state of affairs was found in Hoyle's *Eledone brevis*. In both these species the radula consists only of the median tooth, vestiges of a lateral being detected in *T. gunteri*. These forms represent the end term of a progressive reduction in the outer teeth seen in *E. rotunda*, *E. polymorpha* and certain Bathypolypods. We are irresistibly reminded of the complete loss of the radula in the Cirromorpha. But it remains to be seen what the significance of the reduction and loss of the radula in these forms may be, and whether the loss of the lateral teeth in *Thaumeledone* is a stage in a process of general atrophy, or if it merely represents a progressive concentration of the process of mastication on the median tooth. In favour of the latter, it should be pointed out that the median is very strong and solid in *Thaumeledone*. It may be recalled in this connection that groups of other Mollusca show a similar process of reduction to a single strong tooth, e.g. some Aeolididae and *Elysia* among Opisthobranchs, some Rachiglossa among the Streptoneura and *Chaetoderma* among the Amphineura.

It is a source of great pleasure to record the excellent state of preservation of these specimens. Octopoda of all kinds are usually a source of great trouble to the taxonomist. Contraction, distortion, discoloration and effacement of the epidermal "sculpture" have usually made the task of specific diagnosis unusually difficult. The Discovery specimens, however, are in magnificent condition, even the delicate pelagic forms being little distorted.

NOTE. Certain measurements are given herein in the form of index-numbers in accordance with the system used in a comprehensive work on Octopod classification (Robson, 1929, pp. 24 *seq.*, 38, 42). They may be briefly indicated as follows:

1. Width, index $= \dfrac{\text{maximum width of mantle} \times 100}{\text{length, eyes to apex of mantle}}$.

2. Head, index $= \dfrac{\text{interocular width} \times 100}{\text{length (as in 1)}}$.

3. Arms, index $= \dfrac{\text{maximum arm length} \times 100}{\text{total length}}$.

4. Suckers, index $= \dfrac{\text{diameter of largest sucker} \times 100}{\text{length (as in 1)}}$.

5. Web, index $= \dfrac{\text{depth of deepest sector (edge to mouth)} \times 100}{\text{maximum arm-length}}$.

SYSTEMATIC

Order OCTOPODA, Leach

Sub-order *CIRROMORPHA*, Robson, 1929

Cirroteuthis glacialis, n.sp.

St. 182. 14. iii. 27. Schollaert Channel, Palmer Archipelago. 64° 21′ 00″ S, 62° 58′ 00″ W. 278–500 m., mud. Large otter trawl: one ♂.

Dimensions (in mm.).

Eyes—mantle apex	78
,, —edge of web (between dorsal arms)	140
Interocular width	80
Body, maximum width	58
Fins, length	75
,, width	54
Arm (left), length:	
1st	200
2nd	195
3rd	185
4th	175

Web, depth, in Sector	A	148
,, ,, ,,	B	136
,, ,, ,,	C	116
,, ,, ,,	D	92
,, ,, ,,	E	66

The general appearance is characterised by the extraordinarily deep and heavy fins and the relatively short body and wide head. It is really unlike that of any known species, though in general outline it recalls *C. megaptera*, Verrill (Joubin, 1920)[1]. The arms are in the order 1, 2, 3, 4. The longest bear about seventy-four suckers. The first fourteen to seventeen suckers are very deeply sunk in the surface tissues. When sectioned they are found to be very muscular, the inferior chamber and suctorial surface being exceptionally well developed. This fact, considered in relation to the feebleness of the suckers of some deep-water Octopods, renders the problem of the adaptation of these animals extremely baffling (*v.* anon).

The cirrhi are disposed as usual. They do not exceed about 5·5 mm. in length, and the proximal and distal ones become very minute. The web is of the pattern A, B, C, D, E. E is well under half the depth of A, a remarkable feature. The head is large, and wider than long. The eyes are $\frac{1}{9}$ of the area of the mantle, and are thus of relatively moderate size (Robson, 1926, p. 1349). The fins are very large. Unlike such forms as *C. magna* and *megaptera*[2], in which the fins are also very large, the base is nearly the widest part and is not narrow, as in those species. The striking thing about the fins is their very great depth, which is over $\frac{2}{3}$ of the length from the eyes to the apex of the body. The surface tissues are, as usual, gelatinous, but the general consistency is firmer and more solid than usual. The head and arms and the dorsal surface of the mantle are of a fine bluish purple. The fins and under-surface of the body are more of a reddish tint. A very

[1] It is not at all like the original specimen of *megaptera* (Verrill, 1885, pl. xliii, fig. 1). It resembles a specimen taken in 16° 12′ N, 24° 43′ W and named *megaptera* by Joubin (*loc. cit.*). Very unfortunately Joubin did not describe this example in detail and I am quite unable to say if it is rightly named. Though it resembles this specimen in general proportion, the 'Discovery' example differs from it in the size and shape of its fins.

[2] In Joubin's *megaptera* (*loc. cit.*) the sides of the fins seem to be parallel.

peculiar feature of the oral surface is that the arms and web are coloured the same purple hue, except for a circular band of paler colour about 30 mm. deep, which passes round the mouth at the level of the 14th to the 20th sucker. The oral surface of the arms (but not of the suckers, which is ochreous) preserves the purple shade[1].

The mantle-aperture is very narrow; but it is still to some measure free of the funnel, and not in contact with it at its side. The temporary adhesion of the funnel to the mantle-rim is, however, very perfect. The surface of the funnel is excavated to receive the

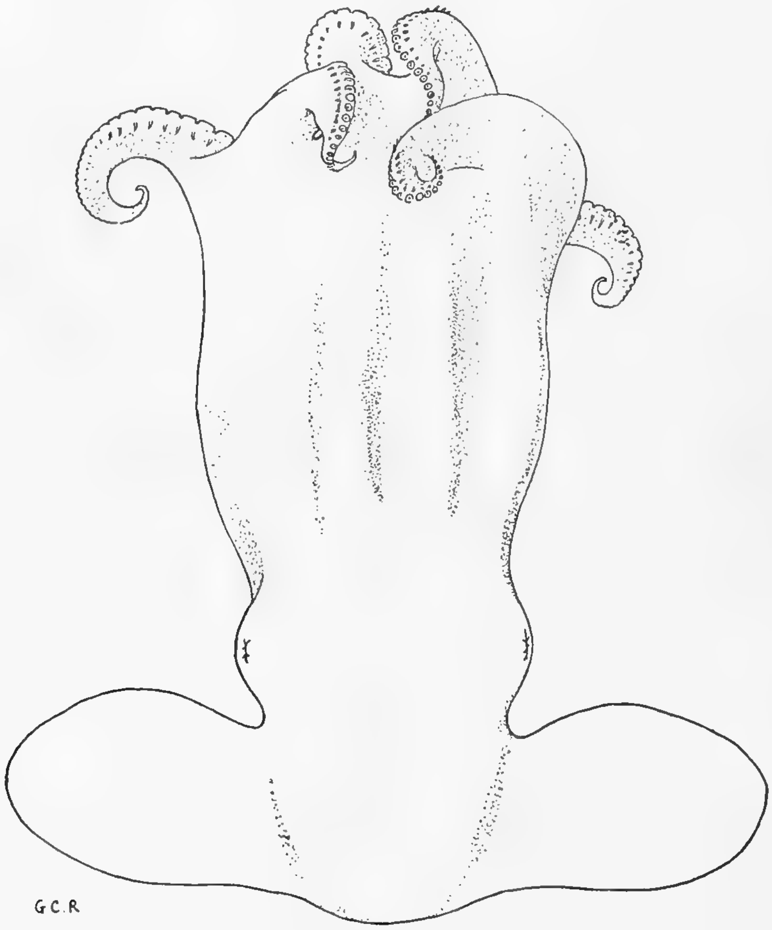

Fig. 1. *Cirroteuthis glacialis*, n.sp. × 1.

mantle-edge and the two elements of the locking apparatus are very well developed. The cephalic element is singularly well developed, especially laterally. In fact I know no other Octopod in which these ridges are so deeply flanged. When the latter are engaged, it seems to me that the intake of water must be entirely prevented, as the base of the funnel is so deep that there is no room for leakage at the sides. This condition is fore-

[1] Since writing this description, which is based on the preserved specimen, I have seen the original colour-sketch made when the animal was alive. The circular band of pale colour turns out to be a circumoral ring of eight round white patches, each of which lies astride an arm. Between this ring and the mouth, the web was bright reddish purple; peripherally and beyond the ring it was of an intense bluish purple. This pattern and coloration are extremely vivid and arresting.

shadowed in *Macrochlaena* (Robson, 1929, p. 194). The funnel itself is well developed. It is narrowly conical in shape, and its organ is well developed (Fig. 3). It consists of a thick-limbed plate in the shape of an inverted V (ʌ). The fin supports (Fig. 2) are like none so far described. As in *Chunioteuthis ebersbachii* and *C. grimaldii* and *umbellata*, the

Fig. 2. *Cirroteuthis glacialis*. Fin support. × *c*. 2.

Fig. 3. *Cirroteuthis glacialis*. Funnel-organ. × 3.

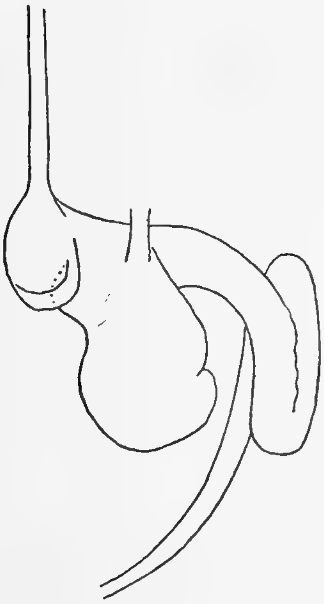

Fig. 4. *Cirroteuthis glacialis*. Alimentary canal. × 1·2.

Fig. 5. *Cirroteuthis glacialis*. Male reproductive organs. × 4.

"arms" of the supports are long. The apical part is angular (rather as in *C. meangensis*) and the whole structure is like a broad-based V.

Pallial cavity. The gills are prominent globular masses, as in *C. umbellata* (Ebersbach, 1915). They are relatively small (about $\frac{1}{5}$–$\frac{1}{6}$ of the pallial area) and consist of six main

laminae, of which the most interior is reduced. I ought to point out here in connection with the general problem of adaptation that, though the gills are reduced in size, the laminae are much more folded, so that the surface of each filament is increased. The median adductor is very small, as in *C. umbellata* (Ebersbach, *l.c.*, fig. 3). On the other hand, owing to an excessive increase of connective tissue, the pallial cavity has become subdivided completely into two, a very unusual condition (cf. Robson, 1928, p. 261).

Alimentary canal (Fig. 4). The mandibles are present and, though somewhat soft, are normally developed. The palatal lamella of each is very small. The radula is absent. The anterior salivary glands are very small. There are no posterior salivary glands. The oesophagus is straight, and there is no crop. The lower end of the canal shows some peculiar features, which must be more fully discussed elsewhere. The stomach is equipped with a remarkably well-developed grinding apparatus. It contained a few fragments of Polychaeta. The caecum is much larger than the stomach, and may include part of the "third stomach" seen in *Opisthoteuthis* and *C. umbellata*. Its contents were so finely reduced that it was impossible to identify them. The intestine is bent on itself, as in *Opisthoteuthis*.

Reproductive organs (♂) (Fig. 5). There is no external trace of sexual differentiation, e.g. no abruptly enlarged suckers as in *S. albatrossi* and *Opisthoteuthis* (Sasaki, 1929, pp. 8, 11). The internal organs are like those of *C. umbellata* (Ebersbach, *loc. cit.*, Text-fig. 17) in general, but the proportions of the first accessory gland to the (conjoined) second and third is different.

Remarks. This interesting form is like no described species. It seems to be most closely related to *C. megaptera* in external appearance. The internal organs are not unlike those of *C. umbellata*. The external appearance differentiates it at once from the other Antarctic species of Cirromorpha (*S. mawsoni*, Berry). It is a pity that Hoyle's Weddel Sea form (1912) was only fragmentary.

I hope shortly to publish a general discussion on this group. In the meantime, I must point out that the question of the adaptive significance of many of the peculiar features of these animals is rendered far more open than my recent account (1926) would lead one to suppose. In spite of the presence of some gelatinous tissue in *C. glacialis*, the arm- and fin-musculature is singularly powerful. The suckers are, if simpler in structure, more muscular than those of many Octopodinae, and are strangely assorted with the feeble mandibles and the absence of the radula. The gills, if small, have their small size compensated by the increased surface. The funnel and locking-apparatus are powerful; the adductor pallii medianus, as in *C. umbellata*, is feeble. This sketch will sufficiently indicate that we have to deal with an actively swimming and darting form with need for an ample supply of oxygen. Its diet seems to be that of a carnivore, but it is not easy to reconcile the lack of radula and the weakness of the jaws with the presence of powerful suckers, unless it be that it is a carrion eater and the suckers are used not for grasping prey, but in coition.

Sub-order *INCIRRATA*, Grimpe

Family ELEDONELLIDAE

Eledonella massyae, Robson, subsp. **purpurea**, subsp. nov.

St. 86. 24. vi. 26. 33° 25′ 00″ S, 6° 31′ 00″ E. 1000 (–0) m. 4½ m. tow net: one ♀.

Dimensions (in mm.).

		Arms, length:	L.	R.
Length of mantle (apex to eye)	53	1st pair	45	—
Mantle, width	35	2nd „	37 +	—
Head, width	18	3rd „	41 (? +)	—
		4th „	40	45

This form is related more closely to *E. massyae* (Robson, 1924, 1924 *a*) than to the other Atlantic or the Pacific forms.

It differs in the following particulars: (1) The suckers (which attain a maximum number of 10) are more widely spaced, viz. 6·5 mm. apart (as a maximum), instead of 4·5 mm. (2) The arms are a little shorter (54 instead of 56 per cent). (3) The funnel-organ (Fig. 6) is longer and more angular. (4) The radula differs in several particulars. In *massyae* the rhachidian bears three cusps on each side of the mesocone, the first lateral five cusps on an average. In the new variety there are two cusps aside on the rhachidian, and four cusps on an average on the first lateral. A still more striking difference is in the size of the mesocone of the rhachidian, which is $\frac{7}{10}$ of the base in the type of *massyae*. In the new variety it is $\frac{1}{2}$ of the base in length. (5) The gills are much smaller in the variety, being about 9 per cent of the mantle in length, while those of the type are about 16 per cent. (6) The colour is deeper and the chromatophores on the head tend to fuse up to a very dark purple hue.

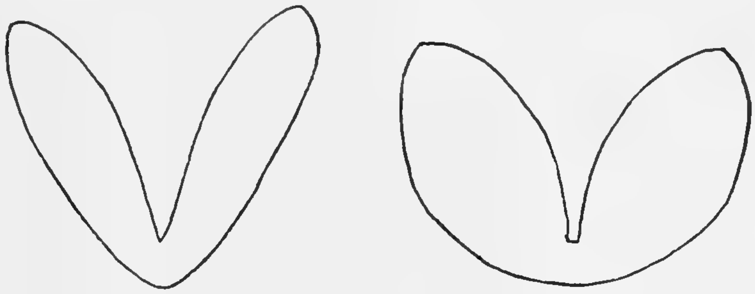

Fig. 6. *Eledonella massyae* (right) and *massyae*, var. *purpurea* (left). Funnel-organs. × 7.

This form is quite adequately distinguished from *E. pygmaea*, Verrill, by the spacing and number of suckers, the proportions of the arms and by the radula[1]; from *B. diaphana* by its characteristic funnel-organ and the number and spacing of the suckers; and from *E. heathii*, Berry, by the spacing and number of the suckers and the relative

[1] I assume that the radula figured by Thiele (1915, p. 491) is correctly referred to Verrill's species.

arm-length. In the remarkably low rhachidian mesocone it approaches *B. diaphana* (Thiele, 1915, fig. 60).

A very peculiar feature, which may be accidental, is seen in the surface tissues of the mantle. The epidermis is free from the underlying viscera, and encloses a spacious cavity in which the viscera and surrounding body-wall, by reason of their small size, are suspended free of the epidermis. I am unable to say if the absence of the subcutaneous gelatinous layer is natural, or caused by some accident of preservation. It seems to me that the latter is most unlikely.

REMARKS. I treat this form as a variety of *E. massyae* rather than as a distinct species, because on the whole the general facies is quite like that of *massyae*. The radula and funnel-organ certainly display marked differences. But for the time being I think the bulk of the resemblances is more important. As in the case of *Alloposus hardyi* (p. 397) we have to deal with a marked and peculiar character (in this case the absence of the subcuticular gelatinous layer), the precise morphological and systematic importance of which we cannot yet decide, as we do not know if it is not produced by accident.

Vitreledonella translucida, n.sp.

St. 273. 31.vii.27. 9° 38′ 00″ S, 12° 42′ 30″ E. 200–230 (–0) m. Young-fish trawl: one ♂.

Dimensions (in mm.).

Mantle, length (eyes to apex)	41	Arms, length:	L.	R.
Mantle, width, % length	68 %	1st pair	45 ?	48
Head, width, % mantle-length	51 %	2nd ,, ...	46	44 ?
Web, maximum depth	14 (?)	3rd ,, ...	31 ?	37 ?
Suckers, maximum width	2·4	4th ,, ...	—	32
,, minimum width	1·0			

DESCRIPTION. The large and rather narrowly ovoid mantle is very unlike that of *V. richardi* (Joubin, 1924, pl. i), *alberti* (*id. loc. cit.* pl. ii) and *V. ingeborgae* (*id.* 1929 *b*, p. 18: fig. 40 seems to show a longer visceral sac than the text would suggest). The head, as in Joubin's species, is extraordinarily short. The eyes are small and prominent. Most of the arms have had their extremities damaged, but I am under the impression that they are in the order 1, 2, 3, 4. They are relatively very short, being about 54 per cent of the total length, as compared with 72 per cent in *V. ingeborgae* (240/330 mm.), 78 per cent in *richardi* and 71 per cent in *alberti* (the dimensions of Joubin's species being taken from the figures and therefore subject to a slight correction). The arms are thick and clumsy (though very transparent and delicate) over the greater part of their length, becoming rather rapidly thinner at the extremities. None of the apical suckers are preserved, except on the hectocotylised arm, so that I am very uncertain as to the total number. There are a maximum of twelve left on one arm, and I am inclined to believe that there were about eight smaller suckers beyond these, i.e. some twenty in all. On most of the arms there are seven to eight small and very widely spaced suckers, followed by about four much larger and more closely opposed ones. These (see above) were probably succeeded

by about eight much smaller ones. The arrangement of the first part of the arm is not unlike that found in *V. ingeborgae*, but the extremity of the arm differs. As in *V. richardii* and *alberti* the suckers are planted in a gelatinous boss, which raises them well above the

Fig. 7. *Vitreledonella translucida.* Funnel-organ. × 6·2.

level of the arm. The enlarged suckers, however, are placed at the ordinary level. They are simple, thin walled, and show scarcely any structural differentiation. The web has been partly destroyed and I am unable to make out its exact form. I believe it attains a depth of

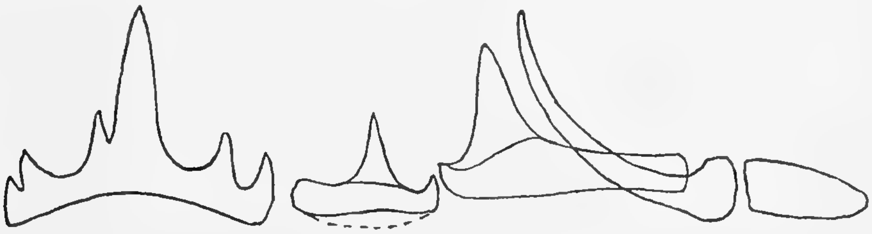

Fig. 8. *Vitreledonella translucida.* Radula.

about $\frac{1}{3}$ of the arm-length. The mantle-aperture is wide, the funnel short and stout. It contains a well-developed funnel-organ of the same general shape as that of *V. richardi*, but differing in sundry features (Fig. 7, and Joubin, 1924, pl. vi, fig. 5). There are seven filaments in the outer demibranch. The inner demibranch is absent as in *V. richardi*.

The radula (Fig. 8). Joubin's figure of *V. richardi* is not like that of *translucida*, except in general plan. The median tooth of *translucida* is markedly asymmetrical, and there is an *Octopus*-like seriation. The admedian has a large median mesocone, small ectocone and shallow base. The second lateral has an obvious inner "heel." The third laterals are long and slender and the marginal plates oblong. The radula is remarkably *Octopus*-like and very unlike that of *Eledonella* and its allies (*v.* anon).

The hectocotylus (?) (Fig. 9). The third arm of the *left* side has the appearance of being hectocotylised. The arm is shorter than its fellows, and on one side there is a narrow lateral membrane (absent from the other arms) like a seminal channel. There are a large number of closely appressed small suckers at the extremity (unlike the other arms). Shortly before the end they terminate in a faintly grooved

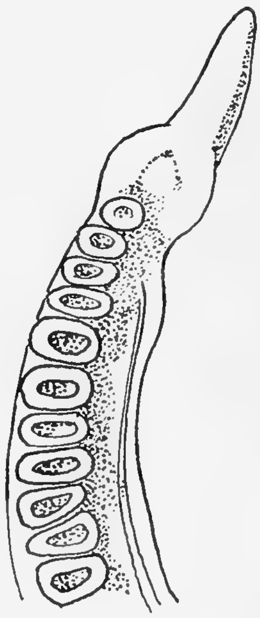

Fig. 9. *Vitreledonella translucida.* Hectocotylus (?). × *c.* 20.

excrescence, into which the presumed seminal channel also runs. The whole structure is not unlike that of *Amphitretus pelagicus* figured by Sasaki (1917, fig. 2). The likeness is heightened by the arrangement of the suckers and the absence of enlarged suckers on this arm. On the other hand, I could find no paired suckers (such as Sasaki figures) beyond the terminal swellings. The occurrence of this presumed hectocotylus on the left side and its resemblance to that of *Amphitretus* is very interesting.

REMARKS. The discovery of another species of this rare and remarkable form is an eminently satisfactory result. I propose to treat its structure as fully as possible in a forthcoming publication, and confine these remarks to the specific status of the Discovery specimen and one or two other points. *Vitreledonella* is represented at present by three species: *V. alberti* (Joubin, 1924, p. 38) was obtained at 33° 40′–52′ N, 19°–19° 16′ W in 0–3500 mm., and at 35° 09′ N, 21° 21′ W in 0–3500 m.; *V. richardi* (Joubin, 1918, p. 1; 1924, p. 15) was obtained at 30° 50′ N, 25° 43′ W in 5300 m.; *V. ingeborgae* (Joubin, 1929 *b*, p. 16) was taken by the 'Dana' at 36° 36′ N, 26° 14′ W in 2000 m. *V. translucida* is quite distinct from all these species. The principal differences are tabulated as shown on the opposite page.

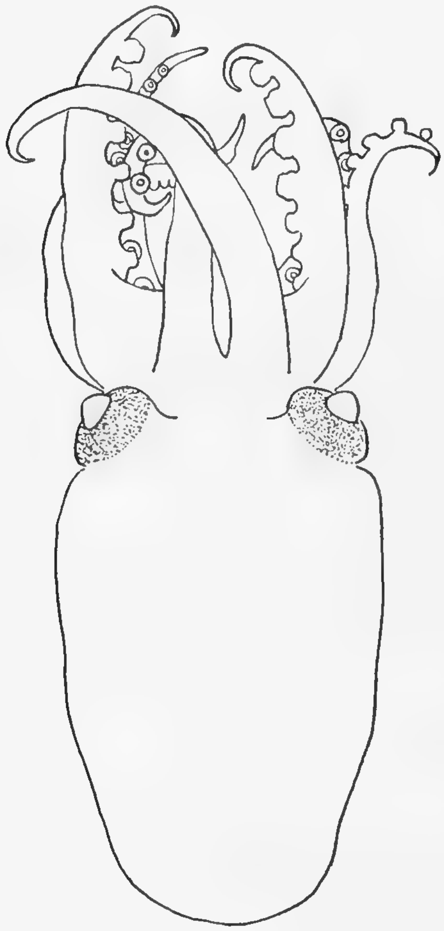

Fig. 10. *Vitreledonella translucida*. × 2. (Semi-diagrammatic.) See p. 380.

Joubin (1924, p. 16) was evidently of two minds as to whether these forms are pelagic or benthic. He admits that, though the net in which *V. richardi* was taken was lowered to a great depth (cf. *id*. 1929 *b*), it might have entered the net at an intermediate depth. The present record conclusively shows that it is a pelagic organism, though it may possibly have a very wide vertical range. Joubin (*loc. cit*. p. 18) makes the highly interesting observation that his *V. ingeborgae* is incubatory.

I shall discuss the affinities of this form more fully in a later publication. It is necessary, however, to point out the close resemblance of the radula to that of the Octopodidae and its divergence from that of *Eledonella* and *Amphitretus*, with which the genus is now ranked (Tribe Ctenoglossa).

	Mantle shape	Web depth	Suckers		Radula	Chromatophores	Length of gill
			Number	Arrangement			
1. *richardi*	Squat (47 × 47 mm.)	? $\frac{3}{10}$ arm length	30 (?)	12–14 (largest)	See below	Very rare on arms, more numerous on dorsal head and mantle	$\frac{10}{47}$
2. *ingeborgae*	Squat (30 × 30 mm.) (Joubin, 1929*b*, p. 18)	Nearly $\frac{1}{2}$ arm length (from fig.)	28	10 or 11–14 (largest)	Not described	Close and numerous everywhere, especially on dorsum	$\frac{8}{30?}$ *
3. *translucida*	Oblong (41 × 27 mm.)	Under $\frac{1}{3}$ arm length	12 large, probably 8 small	9–12 (largest)	Base of rhachidian shallower than in 1; entocone of first lateral much taller; ? shape of second lateral unlike 1, third lateral taller and more slender	Plentiful on arms and head: absent from mantle	$\frac{7}{41}$
4. *alberti*	Squat (41 × 41)	? $\frac{1}{5}$ arm length	22	6–9 (largest)	Not described	? absent	Smaller than in *V. richardi*

* The mantle length is that given on p. 18 of Joubin's paper (1929 *b*). Even if allowance is made for the lack of precision in defining the length, the measurement does not seem to agree with that indicated by Fig. 40 (p. 17).

Family AMPHITRETIDAE

Amphitretus thielei, n.sp. (Pl. III, fig. 2.)

? *Amphitretus pelagicus*, Hoyle, Thiele, 1915, p. 532.

St. 101. 15. x. 26. 33° 50′–34° 13′ S, 16° 04′–15° 49′ E. 350–400 (–0) m. 4½ m. tow net: one ♀.

Dimensions (in mm.).

	R.	L.
Mantle, length from eyes to apex	98	
Mantle, maximum width	52	
Head, width	24 ?	
Arms, length:		
1st pair	—	–
2nd ,,	180 × 82 +	—
3rd ,,	192 !	—
4th ,,	207 +	—

Web, depth in Sector		
A	95	Provisional
B	87	
C	106	
D	100	
E	90	

Description. The body has been somewhat distorted, and the gelatinous coat found in this genus removed (?) by the action of preservatives. The outer tissues are trans-

parent, tough, and traversed by a network of thick fibres. The body is elongate-ovoid, the head very narrow and the eyes, as usual, closely set on the dorsal surface, and very prominent. The arms were probably subequal; but they are badly damaged. They attain a maximum of 67 per cent of the total length. The suckers are uniserial and widely spaced (about 14 mm. apart at the widest). The ends of the arms are damaged, but the suckers seem to have been alternating towards the tips. At about the thirteenth they become much larger. They are of a very simple structure and very thin walled. Except in *Melanoteuthis* I have never seen such an undifferentiated type. There must have been about forty (?) on each arm.

Fig. 11. *Amphitretus thielei.* Inferior mandible. (The pigmented streaks on one side have been omitted.)

The web is about half as deep as the arms and may have been subequal. The funnel is, as usual, adherent to the cephalic tissues, and extends well beyond the eyes. Its organ is large and broadly W-shaped. There is no trace of a valve.

The gills have seven to eight filaments in each demibranch. They are long and narrow and the inner demibranch is very much reduced, being but half as deep as the other. The mandibles are very weak and imperfectly chitinised. They are not so much splayed out as in Thiele's figure of *A. pelagicus*, and differ in many details, especially in the arrangement of the thickenings on the edge of the lower jaw (cf. Fig. 11 and Thiele, *loc. cit.*, fig. 65). The radula differs in many respects from that figured by Thiele, especially in the second and third laterals. The vaginae are remarkably thick and large. They are clearly demarcated from the small spermathecae.

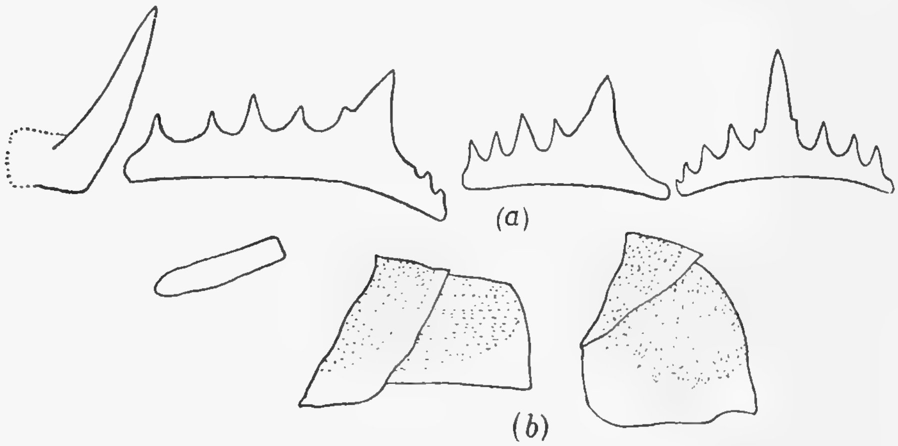

Fig. 12. *Amphitretus thielei.* (*a*) Radula, (*b*) Mandibles.

Remarks. The position of this form is very perplexing. So far a single species of this genus (*A. pelagicus*) has been observed. It was first described by Hoyle (1885, p. 235,

1886, p. 67) from a small specimen obtained off the Kermadec Islands. In 1902 Ijima and Ikeda (1902, p. 85) described a female obtained in 1897 in the Sagami Sea, Japan. Chun (1900, fig. on p. 535) and Thiele (*loc. cit.*) figured and described a third specimen from the Agulhas Stream (34° 31′ S, 26° 2′ E). Sasaki (1917, p. 361) described a male, also from the Sagami Sea. This and the other Japanese specimen were again described by Sasaki (1929, p. 16).

Now it is, to my mind, very uncertain whether all these descriptions relate to one and the same species. Sasaki had the advantage of seeing Ijima and Ikeda's specimen, and regarded it as conspecific with his own. But the relation of the Japanese, the South African and the Kermadec specimens is very uncertain. Hoyle's specimen is very small and in a poor condition, and Thiele only described the radula, mandibles (not known in the Japanese forms) and eye of the 'Valdivia' example, so that we are plainly not dealing with comparable data.

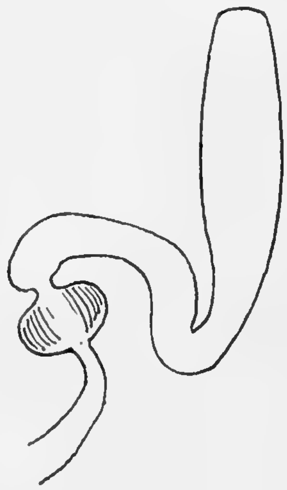
Fig. 13. *Amphitretus thielei*. Female gonaduct, etc. ×4.

Whatever we may think of these forms I am quite convinced that the specimen obtained by the 'Discovery' is not conspecific with any of the previously described forms. This is all the more striking, as it was obtained at no great distance from the spot at which the 'Valdivia' specimen was taken. It is very singular that two different species of this very rare genus should be taken more or less in the same area. However, it should be pointed out that the 'Discovery' specimen was taken to the west of Cape Town, i.e. in the Benguela Stream, and the 'Valdivia' one on the other side of the Agulhas divide.

The following table will make clear the differences:

	Total length	Arms (%)	Web (%)	Mantle width (%)	Suckers, no.	Gill filaments
thielei	305 mm.	67	51	53	? 40 +	7–8
pelagicus:						
Thiele	72 (?) (from fig.)	69 (?)	46 (fig.)	—	—	—
Hoyle (text and specimen)	45	66	75	122 (?)	23	—
Ijima and Ikeda	148	64	72	100	32–35	10
Sasaki (1917, 1929)	135	62	52 (?)	88	32	10

In addition, the radula and mandibles of *thielei* and the 'Valdivia' specimen are singularly unlike, and the funnel-organ of *thielei* agrees with that of neither the type of *pelagicus* nor of the Japanese forms.

Too much store need not be set on these characters, especially as only single specimens are involved. In the 'Valdivia' *pelagicus* the only useful systematic data we know are of the radula, jaws, general shape and web (as seen in the figure of Thiele, *loc. cit.* pl. xci, fig. 6). The web is more like that of *thielei*, about half as long as the arms, not

two-thirds or three-quarters as long as in the type and Ijima and Ikeda's specimens of *pelagicus*. The latter and Sasaki's specimens seem to differ quite markedly from *thielei*. It thus seems that *thielei* is quite distinct from the type and other specimens of *pelagicus*, though in one character it is not unlike Thiele's *pelagicus*. The status of the latter is very uncertain. In the light of this evidence it is quite impossible to do otherwise than treat *A. thielei* as a distinct species.

Concerning the general affinities and status of these forms, I need say very little at present. They plainly present us with a problem of the greatest interest. In the first place, the external "choroidal" gelatinous coating, double pallial aperture, multicuspid teeth and telescopic eyes suggest high specialisation. The remarkably developed teeth, however, seem to accord little with the very weak jaws (the reverse situation in fact to that in the Cirromorpha) and simple suckers. The suckers, teeth, vaginae (?) and gills suggest relationship with the Eledonellidae. The funnel-organ is, however, *Octopus*-like.

Family OCTOPODIDAE

Sub-family *ELEDONINAE*

Forty-four specimens were obtained by the 'Discovery,' all of which were in very good condition. This rich haul, which far surpasses any series obtained previously, provides us with an admirable opportunity of reviewing this characteristic Antarctic group.

In a work, shortly to be published, I hope to discuss in full the systematic relationship of all the forms that have been placed in *Eledone* and the status of the sub-family. I am of the opinion that Naef was correct in his suggestion that the genus may be polyphyletic (1923, p. 716). A final verdict on this subject is not at the moment possible. I content myself with pointing out the following facts:

(1) The Antarctic species so far described differ very markedly from the Mediterranean forms, and certainly do not belong to the same genus. I consider that the name *Eledone* should be kept for *E. moschata* and *cirrosa* and that *charcoti*, Joubin (*aurorae*, Berry *syn.*), *turqueti*, Joubin, *antarctica*, Thiele, *harrissoni* and *adelieana*, Berry, and *polymorpha* (p. 390) should all be placed in *Graneledone*, Joubin. The status of Berry's *albida* is not for the moment clear, though I believe it should be placed with *E. rotunda*, Hoyle, in a distinct genus or sub-genus. *T. gunteri* (p. 392) is placed in a different genus, principally on account of its highly degenerate radula.

(2) The new species now described bring up the number of Eledonid species to sixteen (irrespective of doubtful forms), if we accept Berry's suggestion (1918) that his *aurorae* is identical with *charcoti* and keep *media*, Joubin, as a distinct species (cf. Joubin, 1924, p. 38). Of these nine are from Antarctic or sub-Antarctic waters, three more are from southern waters. The remaining four are from the north Atlantic. The group is very largely absent from tropical waters, and is poorly represented in the Indo-Pacific region. Its metropolis and probable place of origin is the littoral of the Antarctic continent and deeper water further north, with a smaller offshoot in the north Atlantic and Mediterranean.

The identification of the various forms represented in this collection, and their relationship to previously described species, have proved a very difficult matter. They do not readily fall into line with the specific distinctions proposed by other workers, nor am I satisfied that those distinctions represent natural groups. The initial difficulties towards a clear understanding of the Antarctic Eledones will become clear, if the following facts are borne in mind.

(1) In general the parts usually described in systematic papers are very variable and, unless a large number of individuals is available from which a clear statistical expression can be obtained, descriptions such as "web deep," "arms short," etc., are valueless.

(2) The character of the hectocotylus is a valuable feature.

(3) The epidermal sculpture is very liable to be effaced and is subject to modification by the contraction of the skin.

(4) Though very little is known on the subject, it is plain that the proportions of arms, web and eyes alter during development, so that the young stages differ materially from the adults.

Now the descriptions of previously known forms of *Eledone* from this area are difficult to utilise, either because they are based on a single or a few specimens, or because the latter are small, or because females only were available, or finally because they were based on characters of very dubious value.

The species in question are as follows: *E. charcoti*. The type is a rather small female specimen. Joubin subsequently figured (without description) two smaller examples (1914). Massy (1916) described in some detail the anatomy of this form from fifteen adults and five young. She did not, however, describe the variation in the external diagnostic features. Hoyle (1912) described the colour, hectocotylus and radula, using two specimens from the South Orkneys, but without giving other external diagnostic characters. In 1917 Berry described a single male from off Queen Mary Land under the name of "*Moschites aurorae*." Odhner (1923) recorded some examples from South Georgia without full description. The same incompleteness rules in our knowledge of *E. turqueti*. This was originally described from Wandel Island off Danco Land by Joubin (1906) from a single small female specimen measuring 42 mm. over all, and in 1914 he cited (with a few notes and two figures) three small specimens and one much larger example from King George Island, South Shetlands. In 1916 Massy described the anatomy of four specimens (three females, one male) from Rio de Janeiro and McMurdo Sound, Ross Sea.

Turning now to the Antarctic species described by Berry (1917), we find that *M. albida* (Wilkes Land) is known from one female, *adelieana* is represented by a single adult female and two young and *harrissoni* by three females and one other specimen.

From these remarks it will be seen at once that the available descriptions are either based on very small series, or are of uncertain application. The determination of the specimens obtained by the 'Discovery' is therefore of no little difficulty.

In the forty-four specimens available I find that four distinct forms can be recognised:

(1) A broad-bodied form with rather a narrow head and small eyes. The web varies

from 22–42 per cent: the funnel-organ is double, its components are thick and short. The hectocotylus is 8–11 per cent of the third arm. The sculpture is never as close and as well developed as that of *E. charcoti*, though it is of the same type. I regard this form as conspecific with *E. charcoti*.

(2) A broad-bodied, narrow-headed form with exceptionally short arms (57 per cent) and very deep web (60 per cent). The funnel-organ is double. The gill-filaments are exceptionally low (five to six) in number. The eyes are large, but not adnate. The sculpture is highly characteristic, being composed of flattish irregular, very clear-cut, tubercles, rather like those of *O. pallidus*. It has no ink sac and the radula is degenerate. It is so distinctive that I must treat it not only as a new species, but as referable to a new genus (p. 392).

(3) A narrower, smooth or obscurely granular form, with very large eyes. The head is not much narrower than the body. The hectocotylus is rather small (6–8). The funnel-organ is double. This I regard as Joubin's *E. turqueti*, though the original specimen of the latter was very small and, at the same time, unlike those figured subsequently by Joubin. I rely on the later figures for my identification.

(4) More uncertainty invests the fourth form, which seems to occur in two phases, one of which seems to be related to certain forms of *E. charcoti*. I provisionally treat this as a distinct species (*E. polymorpha*). The skin is granular, the eyes moderate to large, the funnel-organ is single and the hectocotylus large (17–9 per cent). It appears in two phases: (*a*) a narrow form with the head as wide as the body and a deep web, and (*b*) a more obese form with a shallower web. This form has a marked tendency to bear a peripheral keel. In other respects it is not unlike *E. charcoti*.

I have carefully considered the relationship of the new species with those given in Berry's key (1917, p. 14), and can find no likeness to any in the latter. *E. polymorpha* has certain features in common with Berry's *E. harrissoni*. This matter is discussed on p. 392 and the possibility that these forms may be conspecific is set aside as most unlikely.

Consideration of the structure of the radula, hectocotylus and other organs leads me to believe that this genus should be sub-divided into several sub-genera to render apparent certain marked structural divergences. Some of these have been already proposed, but I defer to a later publication the complete rearrangement of the group. For a preliminary discussion and remarks on the interesting new genus, *Thaumeledone*, see pp. 374, 392.

Genus **Graneledone**, Joubin

Graneledone charcoti, Joubin.

Eledone Charcoti, Joubin (1905, p. 22).

Thirteen examples (five ♂♂, eight ♀♀) from South Georgia and vicinity.

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. 179–235 m., grey mud. Large otter trawl: three ♀♀ (Brit. Mus. 10 (i–iii)).

St. 42. 1. iv. 26. Mouth of Cumberland Bay, South Georgia. 120–204 m., mud. Large otter trawl: one ♂ (Brit. Mus. 12).

St. 45. 6. iv. 26. 2·7 miles S 85 E of Jason Light, South Georgia. 238–270 m., grey mud. Large otter trawl: one ♀ (Brit. Mus. 3). Three ♂♂ (Brit. Mus. 13).

St. 123. 15. xii. 26. Mouth of Cumberland Bay, South Georgia. 230–250 m., grey mud. Large otter trawl: one ♀ (Brit. Mus. 7).

St. 140. 23. xii. 26. Stromness Harbour to Larsen Point, South Georgia. 122–136 m., grey mud and stones. Large otter trawl: one ♀ (Brit. Mus. 15).

St. 154. 18. i. 27. Jason Harbour to Larsen Point, South Georgia. 60–160 m., mud. Large otter trawl: one ♀ (Brit. Mus. 6).

St. WS 25. 7. xii. 26. Undine Harbour (North), South Georgia. 18–27 m., mud and sand. Small beam trawl: one ♂ (Brit. Mus. 16).

St. WS 32. 21. xii. 26. Mouth of Drygalski Fjord, South Georgia. 225 m., grey mud. Small beam trawl: one ♀ (Brit. Mus. 8).

The body is usually plump and the head narrow, the mantle index averaging 116–93, that of the head 84–60. The average form of the head and body is thus very like that figured by Joubin. The arms are short, 72–76 per cent of the total length. The suckers do not vary in diameter as between males and females (range 12–8·3 per cent). The web is 42–22 per cent of the arms. E tends to be larger than A, and C is the deepest. There is usually a trace of a lateral keel. The sculpture is very variable. It should be noted here that Joubin's earlier description dealt with a heavy sculpture of closely apposed boss-like tubercles. His later description was of a more granular sculpture (cf. 1914 [?], fig. 1). In the material before me I find a similar variation which may be tabulated as follows:

Brit. Mus. 3: rather isolated warts, nearly obsolete apically; warts present on inner side of arms; ? ocular cirrhi.

Brit. Mus. 12: large (not close) and granular warts; ocular cirrhi absent.

Brit. Mus. 7: warts ? originally well developed, though widely spaced, now very much worn; ocular cirrhi present.

Brit. Mus. 8: warts very small; ocular cirrhi.

Brit. Mus. 15 = 3: ocular cirrhi present.

Brit. Mus. 16: warts granular; ocular cirrhi.

Brit. Mus. 13 = 3: but warts sparser; ocular cirrhi.

Brit. Mus. 10: (two specimens too much wrinkled to examine). Small close warts; ocular cirrhi present.

The specimens from the 'Terra Nova' collection are more regularly warty and less granular than the Discovery ones, and I think are nearer Joubin's heavily sculptured form.

The funnel-organ is VV-shaped and, as indicated by Massy, the limbs are coarse and thick, though they are not always so coarse as is seen in her figure. There are eight to eleven filaments in each demibranch. The hectocotylus is 8–11 per cent of the arms. The calamus is well developed and acute, the ligula usually well excavated, with thick sides. A number of rather feeble laminae are present. The hectocotylus, it should be noted, is far more like that of *Octopus* than are those of the European forms, which lack a calamus. I suggest that the Antarctic forms are more archaic in this respect. The penis in two specimens (10) was short and coarse, and bears a large saccular diverticle containing an enormous spermatophore, about 82 mm. long, and very thick (cf. Massy, 1916, p. 153).

Graneledone turqueti, Joubin.

Eledone Turqueti, Joubin (1905, p. 29).

St. 158. 21. i. 27. 53° 48′ 30″ S, 35° 57′ 00″ W. 401–411 m., rock. Large dredge: three young specimens (♂ 1, ♀ 1, ? sex 1) (Brit. Mus. 4 *a*).

St. 181. 12. iii. 27. Schollaert Channel, Palmer Archipelago. 160–335 m., mud. Large otter trawl: three adult specimens (2 ♂♂, 1 ♀, two inv.) (Brit. Mus. 4). (?)

The body is saccular, and the head but little narrower than the mantle. The arms are very short (72–64) and the suckers small (11·5–7·4). The biserial arrangement of the suckers on the fourth arms, noted by Joubin in his first description, is found in one Discovery specimen; but this feature is not of diagnostic value. The web is markedly bilateral, C and D being much deeper than A and E. The web is shallow. In the Discovery specimens it is 20–25 per cent of the arms. In one 'Terra Nova' example it reaches 27 per cent. The head is broad, and the eyes very large. The skin is either quite smooth, or else here and there it shows traces of fine granulations. It is of a more or less uniform light purple colour.

The mantle aperture is very narrow. The funnel-organ is VV-shaped; in the larger specimens its limbs seem to be almost as thick as those of *charcoti*. There are ten to eleven filaments in each demibranch. The hectocotylus is small, about 6 per cent of the hectocotylised arm, that of the only 'Terra Nova' male being 7 per cent. Unfortunately, this organ is fully developed in none of the Discovery males. In the largest it looks as though it might ultimately grow to resemble that of *charcoti*. The penis has a large bent receptaculum, as in *charcoti* (above).

Remarks. Joubin's species was, as already pointed out, based on small examples.

Graneledone polymorpha, n.sp. (Pl. III, fig. 1.)

St. 39. 25. iii. 26. East Cumberland Bay, South Georgia. 179–235 m., grey mud. Large otter trawl: one ♂ (Brit. Mus. 10 (iv)).

St. 42. 1. iv. 26. Mouth of Cumberland Bay, South Georgia. 120–204 m., mud. Large otter trawl: seven specimens (3 ♂♂, 4 ♀♀) (Brit. Mus. 12).

St. 45. 6. iv. 26. 2·7 miles S 85° E of Jason Light, South Georgia. 238–270 m., green mud. Large otter trawl: one ♀ (Brit. Mus. 13 (iv)).

St. 142. 30. xii. 26. East Cumberland Bay, South Georgia. 88–273 m., mud. Large otter trawl: six specimens (1 ♂, 5 ♀♀) (Brit. Mus. 1).

St. 148. 9. i. 27. Off Cape Saunders, South Georgia. 132–148 m., grey mud and stones. Large otter trawl: two ♀♀ (Brit. Mus. 9).

St. WS 62. 19. i. 27. Wilson Harbour, South Georgia. 15–45 m. Small beam trawl: four specimens (2 ♂♂, 2 ♀♀) (Brit. Mus. 14). (?)

St. MS 63. 24. ii. 25. East Cumberland Bay, South Georgia. 23 m. Small beam trawl: one ♂ (Brit. Mus. 11). (?)

St. MS 68. 2. iii. 25. East Cumberland Bay, South Georgia. 220–247 m. Large rectangular net: two specimens (1 ♂, 1 ♀) (Brit. Mus. 5).

Description. This form occurs in two phases, the external features of which are described separately here.

(1) Form *oblonga* (13 (iv), 10 (iv), 5 (i)). The mantle is narrow (80–64) and the head but little narrower (69–61). The arms are 73–67 per cent of the total length. The suckers are very small, 7–8 per cent. The web is deep, 38–34 per cent. The proportions of the sectors vary. The eyes are rather large. There are seven to eight filaments in each demibranch. The funnel-organ is W-shaped. The surface is covered with rather widely spaced, small granules. In 5 (i) these are larger than in the other two, and might pass as small warts. 5 (i) is rather different from the other two, not only in sculpture but also in its web (which is longer than in the other two examples and is in addition equal in all its sectors save E) and in its wider body. The hectocotylus of 5 (i) and 10 (iv) are, however, both long (15 and 13·9 per cent respectively) and very alike. The calamus is acute and upstanding, the ligula rather shallower than in *charcoti* and crossed by a number of deep laminae, which resemble those of a *Bathypolypus*.

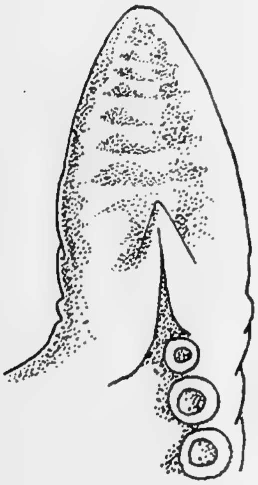

Fig. 14. *Graneledone polymorpha*. Hectocotylus. × 3.

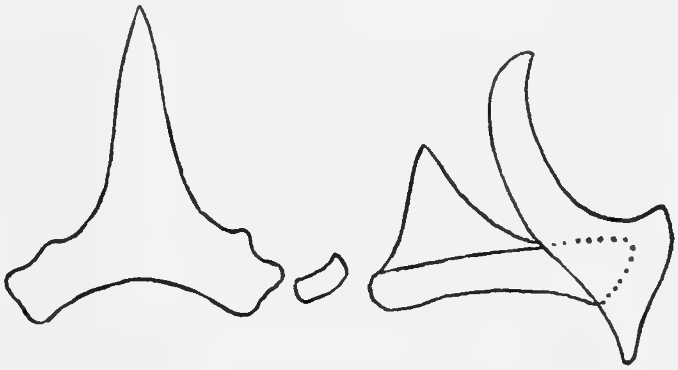

Fig. 15. *Graneledone polymorpha*. Radula.

(2) Form *affinis* (1, 9, 11, 12, 14). The body is rather wide, its index being 104–70. The head is usually much narrower, 93–53 per cent, the most usual form being that with a globular body and small, clearly defined head. The arms are about as long as the form *oblonga*, viz. 74–66. The suckers range from 11·6–7 per cent. The web is distinctly shallower (30–27 per cent) and tends to be rather regularly bilateral. The eyes are moderate to large. The sculpture, as in *oblonga*, varies from fine, rather widely spaced granules to granular warts. The funnel-organ is W-shaped. There are seven to ten filaments in each demibranch. The hectocotylus (Fig. 14) varies from 17 to 9 per cent (? 7 per cent) of the arm in length. The forms of the ligula and calamus are very like those in var. *oblonga*, though the copulatory groove is narrower, and its walls correspondingly thicker. This condition is best seen in the male from Station 42. In the other males the organ is more like that of *E. charcoti*.

In both forms the dorsal surface is demarcated from the ventral. In practically every example there is a well-marked ridge, in some specimens amounting to a thick keel (e.g.

in some from Station 142). This ridge or keel is absent in the specimen from Station MS 63. The radula (Fig. 15) has a rhachidian with a long stout mesocone, the height of which exceeds the base. There are, on some teeth, faint traces of entocones; but the tooth is to be regarded as unicuspid. The admedian is small, narrow and has a low, blunt entocone. The second lateral has a rather narrow and shallow base with a low, heavy subterminal cusp. The third laterals are small, much curved and have wide bases.

The colour in all these specimens varies from dull olivaceous purple to brown.

REMARKS. I am far from certain as to the status of all the forms which I have placed in this species. Perhaps the issue will be narrowed a little, if we realise that, of all the previously described species, its closest relationships are with *E. charcoti*. It clearly has no connection with the smooth Antarctic forms *adelieana* and *albida*, from both of which it differs in many characters.

Similarly it is very unlike *turqueti*. The squatter phase has some likeness to *E. harrissoni* and, indeed, from the key given by Berry (*loc. cit.* p. 14) one might think that the two forms would prove to be identical, except for the difference in the form of the funnel-organ. Moreover, the "dull clouded slaty grey" colour, alluded to by Berry, is very often found in *polymorpha*. On the other hand, the form of the funnel-organ and radula, the shape of the eyes, head and body and the greater depth of sector A of the web (20–23 per cent in *harrissoni*, 30–27 per cent in *polymorpha*) are all characters which make it impossible to identify the two forms.

There remains *E. charcoti*, and with that form the resemblance is nearer. As far as the bodily proportions, arms, suckers and gills are concerned, the two species do not differ in any material respect, except of course in so far as the form *oblonga* is much narrower. The web of the latter, but not of form *affinis*, is as deep as that of *charcoti*. The sculpture in the more extreme forms (e.g. the type) of *charcoti* is, of course, very distinctive; but there are specimens in which it is more granular and like that of *polymorpha*. The following characters, which seem to be regularly associated, are, to my mind, good differentia: the form of the funnel-organ, hectocotylus and radula, and the regular presence of a prominent and well-developed keel (either absent or seen merely as a poorly developed ridge in *charcoti*). It must be borne in mind that, in the array before us, there are a certain number of individuals which exhibit various combinations of the characters of the two species, and may be hybrids. The species are to be recognised on account of the higher frequency of certain character-associations.

Genus **Thaumeledone**, n.gen.

The radula is very degenerate, being reduced to little more than the rhachidian teeth. There is no ink sac. The funnel-organ is double. The gills are very much reduced. Type of the genus: *Eledone brevis*, Hoyle.

Thaumeledone gunteri, n.sp. (Pl. IV, fig. 3.)

St. 158. 21. i. 27. 53° 48′ 30″ S, 35° 57′ 06″ W. 401–411 m., rock. Large dredge: one ♀ (Brit. Mus. 2) [Type].

Dimensions (in mm.).

Dorsal mantle, length	36
Head, width, % mantle length ...	86
Mantle, width, % mantle length ...	111
Arms, % total length	57
Suckers, diameter, % mantle length	8·3
Web, index	60

The body is globular, and the head distinctly narrower than the body. It is, however, rather broader than is usual in *charcoti*. The eyes are distinctly larger than in most examples of the latter. The arms (see above) are very short for an adult Octopod, being amongst the shortest recorded. The suckers are small and close set. The sectors of the web are, I think, subequal, C and D being slightly deeper than the others. The web is very large, and attains the great depth of 60 per cent of the arms. The surface is rather a rich, light purple dorsally, becoming paler ventrally. It is covered dorsally and laterally by a number of close-set warts. These are very curious, and confer on the animal a rather mossy appearance. On the sides of the web and on the arms they tend to be circular and bubble-like. On the anterior surface of the web, head and body, they are branched and irregular, and it is here that they are seen to stand out very clean-cut from the surface. They remind me of the similarly clean-cut warts in *Octopus pallida*, though they are not stellate in *gunteri*. It is possible that they may be like those of a form of *charcoti*. Joubin (1906, p. 6) says that in the latter some of the warts were probably branched. From the figure (*loc. cit*. pl. i, figs. 1–2) it is quite evident that, in *charcoti*, the warts on the head and body are in contact with each other, while in *gunteri* they are quite separate. In Joubin's later figure (1914[?], p. 36) and in one of the 'Terra Nova' specimens the warts are quite separate but, in the former, they are granular, and in the latter, they are mammiform, both very unlike those in *gunteri*.

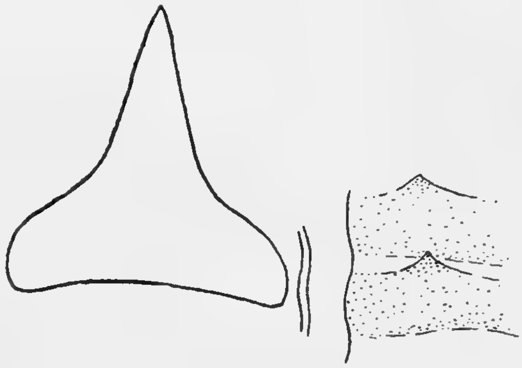

Fig. 16. *Thaumeledone gunteri*. Radula. (The remains of the degenerate second laterals are shown dotted.)

The funnel is short, narrow and pointed. The funnel-organ is VV-shaped. The limbs are rather slender and pointed at each end. They remind one of those of *E*. "*aurorae*" (Berry, 1917, fig. 14). There are five to six filaments in each demibranch, a very low number. The ink sac is absent. The radula is degenerate and represented by a simple unicuspid rhachidian, the mesocone of which is low and stout. There are faint traces of admedian teeth and of an oblong second lateral with a low cusp.

Remarks. This species has a superficial resemblance to *E. charcoti*. For a long time I considered that it should be treated as a well-marked sub-species of the latter, especially since only a single specimen is available, and that a female. The profound differences in radula, etc., were then discovered. The degeneration of the radula and loss of the ink sac, length of the arms, depth of the web, number of gill filaments, the sculpture and,

in a less degree, the shape of the funnel-organ components and head, form a highly peculiar and characteristic assemblage.

Upon examination of other species of *Eledone* from adjacent seas I find that *E. brevis*, Hoyle (1886), has a degenerate radula of the same type as *gunteri*. It is also devoid of an ink sac. Though quite distinct specifically, I consider that these two interesting forms are congeneric.

Sub-family *BATHYPOLYPODINAE*

Benthoctopus sp. (? januarii var.). (Pl. IV, fig. 2.)

St. WS 86. 3. iv. 27. 53° 53′ 30″ S, 60° 34′ 30″ W. 151–147 m., sand, shells and stones. Commercial otter trawl: five specimens (3 ♂♂, 2 ♀♀).

Dimensions (in mm.).

	Mantle length	Width % Length	Head, width, % mantle length	Arms (index)	Suckers (index)	Gills	Web (index)	Ligula (index)
1. ♀	92	88	66	79	7·6	—	21	—
2. ♂	73	76	65	79	6·7	10	25	6·6
3. ♂	64	82	71	79	?	10	29	5·6
4. ♂	43	100	100	75	8·1	—	30	3·1
5. ♀	43	88	88	77	8·1	10	36	—

It will be seen from these figures that the five specimens are by no means alike. I think, however, that the differences between the two larger and the two smaller are mainly referable to age. All five specimens have unmistakably the same general facies, though the smaller are admittedly squatter and broader headed. In addition to the features indicated above the following points must be noted. The skin is entirely smooth, and there are no cirrhi of any sort. The funnel-organ is W-shaped. It is better preserved in the younger specimens, and in them it is rather widely spread and thin limbed. In the older specimens it seems thicker and narrower, though of this I am not quite certain, as the organ is not well preserved in them. The gill is remarkably deep, the longest filament measuring 18 mm. in the largest specimen. The inner demibranch is little reduced. There is no ink sac in any of the specimens. The radula is not unlike that of *B. januarii*, at least in so far as its admedian and first lateral teeth are concerned. The rhachidian has the same general type of seriation in both species, but differs in sundry details. The third laterals are more slender in the Burdwood Bank forms.

The *hectocotylised arm* is 56–69 per cent of the longest arm. The ligula is short and pointed, and in no. 2 (the best developed) the copulatory groove is deep and narrow, the sides thick and traversed by transverse grooves. The calamus is well developed and reaches about a third of the way along the organ.

The internal male organs. Needham's organ has a moderate head and slender extremity. There is but a feebly indicated appendix. The penis has a moderate diverticle. There are numerous thread-like spermatophores, about 45–47 mm. long, with very

slightly swollen heads. They are of a peculiar milky white colour. The spermatophores of *B. januarii* are much thicker and have swollen heads.

The *colour* in all the specimens is a pale fawn-pink.

REMARKS. This very interesting form has given me a good deal of trouble, and I am still undecided as to whether it is a distinct species or a form of one of the South American or sub-Antarctic species. It seems to have distinct affinities with *B. januarii* (*s.s.*) and *B. magellanicus* (Robson, 1930*a*, p. 332), and some likeness to *B. eureka*. For the time being, and until the work I have on hand upon the genus is completed, I think it better to give this a non-committal description. The following list exhibits the differences from the more closely related forms:

(1) It differs from *B. januarii* in (*a*) arm-length, (*b*) web depth, (*c*) form and size of hectocotylus, (*d*) size of gills, (*e*) spermatophores. The general facies (smooth rounded body and large eyes, and radula) are points in common.

(2) It differs from *B. magellanicus* in (*a*) funnel-organ, (*b*) colour, (*c*) hectocotylus. The sculpture (if any) of *B. magellanicus* is not properly known.

(3) It differs from *B. eureka* in (*a*) form of penis, (*b*) appendix, (*c*) radula, (*d*) colour.

I should point out that the other members of the Octopodidae reported from Magellanic waters are either referable to *Joubinia* or *Enteroctopus* and cannot be identified with this form for many reasons. Hoyle's "*Polypus brucei*" from the Burdwood Bank (1912) is a form of Gould's *E. megalocyathus* with which also Lönnberg's *O. patagonicus* is synonymous.

Benthoctopus magellanicus, Robson.

St. WS 97. 18. iv. 27. 49° 00′ 30″ S, 61° 58′ 00″ W. 146–145 m., sand, gravel and stones. Commercial otter trawl: one ♀.

This species was distinguished by me (1930*a*, p. 332) from *B. eureka* by certain features that still seem to me important. It is a little unfortunate that the female of the nearly-allied *B. eureka* is unknown, and also that there is as yet no comparable material of the funnel-organ which, in the Paris specimen (♀) originally labelled "*O hyadesi*" (see Robson, *l.c.*, p. 330), is so characteristic.

The following table and data will show that this specimen, which measures 385 mm. over all, is probably more like *B. magellanicus*:

	(1) Discovery WS 97 (♀)	(2) *magellanicus* (♀ ♂) (Robson, 1930*a*)	(3) *eureka* (♂) (Robson, 1929)
Arm-length (% total length)	77	78–74	79–81
Suckers, diameter (index) ...	13	10–9	12
Web, depth (index)... ...	32	32–31	23–28
Colour	Reticulate, purple on a light ground	= no. 1	Dark purple with a few patches of pink on dorsum

In addition, the Discovery specimen has long, narrow and crescentic eggs (21 × 5·5 mm.) exactly like those of *magellanicus*. The size and shape of the oviduct is exactly alike in the two forms, and the relative proportions of oviduct and vagina are alike. The form of the funnel-organ is uncertain.

While admitting the very remote possibility that *magellanicus* is a form of *eureka*, I believe that the Discovery specimen is more like the former than the latter (except in the diameter of the suckers). We have no female of *eureka* for comparison, but it is worth pointing out that, though the Discovery specimen and the type female and male of *magellanicus* are very alike, the latter differs from the *eureka* (male) in the hectocotylus.

Sub-family *OCTOPODINAE*

Octopus (Enteroctopus) megalocyathus, Gould.

St. 222. 23. iv. 27. St Martin's Cove, Hermite Island, Cape Horn. 30–35 m. Large rectangular net: one ♀.

Dimensions (in mm.).

Mantle, length, eyes to apex		44
,, width, % length		81
Head, width, % mantle length		68
Arms, length:	R.	L.
1st pair	136	137
2nd ,, ...	132	136
3rd ,, ...	—	118
4th ,, ...	126	120
Arms, % total length	75	

Suckers, maximum diameter (as % mantle length)	18
Web, depth, in sector A	37
,, ,, ,, B	39
,, ,, ,, C	39
,, ,, ,, D	38
,, ,, ,, E	29
Web, % longest arm	30

While admitting that the correct names and the identity of the Magellanic Octopodinae are still uncertain, I do not feel much hesitation in referring this specimen to the broad form of Gould's species as re-defined by myself (1929). The very characteristic funnel-organ, like a flattened W (cf. Robson, 1929 *a*, p. 617, and 1930, p. 240), wide suckers, smooth skin, light brown colour, the number of branchial filaments (eleven in each demibranch), the form of the web (A, B, C, and D subequal, and E more or less markedly shorter), all remind one strongly of certain forms of *megalocyathus*. The arms are rather shorter, and the web is certainly deeper than in the average *megalocyathus*. The ink sac is present. The oviducts, etc., and ovary are in a very undeveloped (? atrophied) condition.

Octopus (Octopus) rugosus (Bosc).

St. WS 237. 7. vii. 28. 46° 00′ S, 60° 05′ W. 150–256 m., coarse brown sand, shell fragments. 7 mm. mesh net on trawl: one ♀.

Simon's Town. 29. vi. 27. Found while draining the dock: one ♀.

The specimen from near the Falklands is typical in respect of its colour and reticulate pattern, squat body, rather broad head, shortish arms and web-form. The skin is closely and tightly wrinkled, and it is impossible to say if the typical shagreen of rough warts is

present. In any case, however, I think that it is smoother than is usual and in parts may be entirely smooth. It is otherwise so characteristic that I do not hesitate to identify it with Bosc's species. Sector A, though shallower than E, is not noticeably shallower (as is usually found in *O. rugosus*).

The specimen from Simon's Town is a typical form with well-developed sculpture of neat, close multifid warts. The colour is rather dark, but the characteristic reticulate pattern is well seen.

Octopus (Octopus) vulgaris, Lam.

Simon's Town. 29. vi. 27. Found while draining the dock: one ♀.

A very large specimen with typical sculpture, about 120 mm. long in dorsal mantle length. The arms are so much contracted that I cannot satisfactorily ascertain their length and that of the web. The suckers, as in some old females of this and other species, are very wide, the index (see p. 374) amounting to 15–16. It is a pity that it is not possible to study this specimen in greater detail, as it is desirable to check carefully all identifications of this species in tropical and southern latitudes.

Family ARGONAUTIDAE

Sub-family *ALLOPOSINAE*

Alloposus hardyi, n.sp. (Pl. IV, fig. 1.)

St. 288. 21. viii. 27. 00° 56′ 00″ S, 14° 08′ 30″ W. 250 (–0) m. Young-fish trawl: one ♂.

Dimensions (in mm.).

Mantle, length, eyes to apex		40	Web, depth, in sector	A	50
,, width		35	,, ,, ,,	B	43
Head, width		38	,, ,, ,,	C	36
Arms, length:	R.	L.	,, ,, ,,	D	24 ?
1st pair	?	112	,, ,, ,,	E	18 ?
2nd ,, ...	83	87 ?			
3rd ,, ...	?	?			
4th ,, ...	60	50			

The body seems to be broadly ovoid. Its width is only a little less than its length. It decreases in width from the level of the base of the arms towards the apex. On the left side there is a low keel. The general shape recalls that of the short, broad form of *Bathypolypus arcticus*. The eyes are large and prominent. The arms are 73 per cent of the total length and are, as usual in the group, in the order 1, 2, 3 (?), 4, the last arm being about half the first in length. The web is in the order A, B, C, D, E, E being nearly $\frac{1}{3}$ the depth of A. The tissues are almost entirely gelatinous. A very remarkable feature may be noticed at this point. Viewed laterally (Fig. 17) the animal bears a striking resemblance to the extraordinary new form described by Joubin (1929 *a*, p. 383) as *Retroteuthis*, in that the velar area has undergone a rotation through about 60–70° and its anterior surface has become largely attached to the dorsal region. The

result of this rotation is that, if we imagine the animal orientated with its oral surface downwards in the traditional horizontal plane of the Cephalopod, the mantle aperture instead of being posterior has become dorsal. This is exactly what has happened in Joubin's *Retroteuthis* and also in his *Heptapus* (Joubin, 1929 *b*, p. 13). In that genus Joubin failed to find any indication that the condition is anything else than normal. In this instance I am in practically the same position. Not only is the posture of the body altered in relation to the oral surface, but the web has definitely become concrescent with the dorsal tissues, and ventrally it has become elongated, apparently as a result of (or to meet) the pressure imposed on it by the backward rotation of the visceral mass and head. I do not think this can be caused by accidental distortion or pressure. On the other hand, this form is very gelatinous, and I am not quite clear as to what distortion might occur when a rather heavy gelatinous organism of this kind is kept permanently on a hard surface.

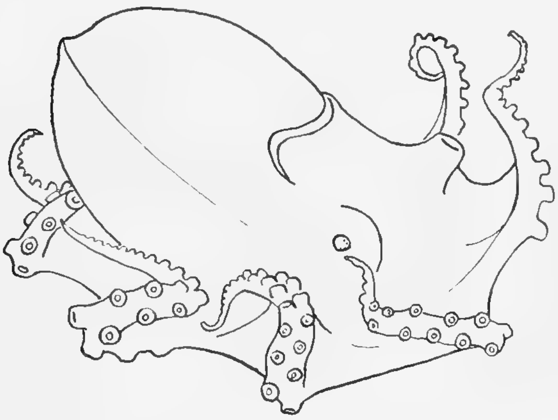

Fig. 17. *Alloposus hardyi*. × *c*. 1·5. (Semi-diagrammatic.)

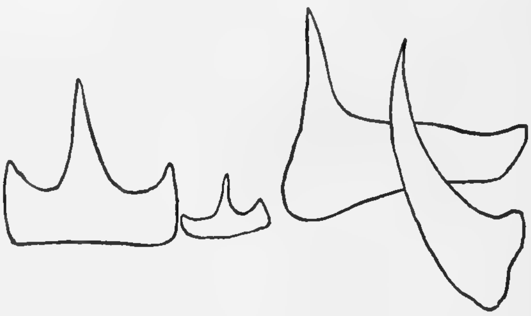

Fig. 18. *Alloposus hardyi*. Radula.

If the rotation is normal, its origin is very obscure. The animal was taken near the surface in water of a depth of 1600 fathoms and must therefore be pelagic. The modification can have no relation, as far as I can see, to crawling on the bottom, and in any case the normal Octopod posture is suited to this. It is noteworthy that *Retroteuthis*, which also shows a similar modification, is quite remotely allied to *A. hardyi*.

The suckers tend to be uniserial or very widely alternating except about and just beyond the margin of the web where they are more or less biserial. They are very prominent but small (6·2 per cent of the mantle length) and extremely weak. Like those of *A. mollis* (Joubin, 1900, pl. v, fig. 14) they are simple, undifferentiated cups, but the walls are everywhere thinner in *A. hardyi*.

The mantle aperture is as in *Alloposina microcotyla* (Hoyle, 1904, p. 9) shaped like a flat W. Its pallial edge is non-adherent. The funnel is mainly incorporated in the head, but there is a free tubular portion about 8–10 mm. long. The shape of the funnel-organ is obscure. Unlike the other forms there are a number of longitudinal folds near the aperture, below which are the remains of what may have been a W-shaped funnel-organ. The gills have six to seven filaments in each demibranch.

The mandibles are unlike those of *A. mollis* (figured by Joubin, 1895, fig., p. 16) in that there is no marked sub-rostral notch. The radula resembles that of *mollis* in general (Joubin, *loc. cit.* pl. v, fig. 11) but differs in sundry details. The shape of the first and third laterals are in particular different. These two species differ markedly from *pacificus* (Sasaki, 1929, p. 18 [*A. pelagicus*] in error) in having bicuspid admedians.

There was no trace of the hectocotylus, but exploration of the mantle cavity revealed the presence of a penis with a long diverticle.

Remarks. Verrill (1880, p. 393) included in his definition of *Alloposus* the words "mantle united firmly to the *head* by a ventral and two lateral commissures." Hoyle (1886, p. 72) adopted the genus for a "North Atlantic" fragment without questioning the definition. Joubin (1895, 1900 and 1920) does not discuss the latter, though he used the name for various North-east Atlantic fragments. In 1904 (p. 9) Hoyle in discussing the relationship of *Bolitaena* (= *Alloposina*) *microcotyla* does not allude to infundibulo-pallial sutures.

In 1902, however, Ijima (in Ijima and Ikeda, 1902, p. 87, footnote) commented on Verrill's description and said that the median infundibulo-pallial suture seems to be simply a part of the ventro-median septum (median pallial adductor) which is extended far forwards and passes under *but does not join* the ventral edge of the funnel. He also explains away Verrill's "lateral longitudinal commissures."

This feature is not discussed by Berry (1914, p. 286) in his description of the Pacific form of *A. mollis*, nor does he include it in his family and generic definition.

Lastly it is ignored by Sasaki (1929, p. 17) in his description of *A. pacificus*. Naef (1923, figs. on p. 727 and p. 731) describes and figures this infundibulo-pallial suture, but I think purely on the strength of Verrill's account!

It must be admitted that there might be room for confusion here. Thus, we might have grounds for suggesting (*a*) that Verrill was not likely to be mistaken, (*b*) that the subsequent forms, most of them obviously fragmentary, identified as *Alloposus* by Hoyle, Joubin and Ijima[1], etc., were not referable to that genus. In any case no one seems to have troubled to examine the type of *A. mollis*. What grounds have we then for accepting the subsequently described forms as referable to *Alloposus* and for modifying Verrill's description in an important feature, viz. the siphono-pallial suture?

Actually there is singularly little common ground in the description of Verrill, on the one hand, and of the later writers on the other. Thus Verrill figures the hectocotylus, but this organ is certainly unknown in Berry's specimen and those of the Japanese writers. Joubin and Sasaki figure the radula of the East Atlantic and Japanese (*pacificus*) forms, but it is not known in Verrill's or Hoyle's specimens. Verrill did not describe the funnel-organ. The common factors are the gelatinous tissues, suckers tending to be partly uniserial, wide mantle aperture, deep web and funnel reaching beyond the eyes. We cannot infer from Berry's female specimen if this form has the remarkable

[1] Ijima makes the observation on his *A. mollis* that "there are two buttons at the siphon base, fitting into grooves on the inner surface of the mantle." Sasaki does not mention this Decapod-like trait characteristic of the Argonautidae in his review. There is no "stud and socket" adhesive organ in *A. hardyi*.

Argonautid sex dimorphism or the peculiar hectocotylus. The dimorphism and hectocotylus are not described in *A. pacificus* or in the East Atlantic forms described by Joubin. On the whole this is not a very propitious situation for judging whether the various specimens are congeneric with the type! For the time being I think there is nothing to be done but to be guided by "general facies" and to retain the forms described by Joubin, Hoyle, Sasaki and Berry in *Alloposus*, pending an examination of the type of *A. mollis*.

A. hardyi differs from *A. mollis* (Verrill's description, *loc. cit.* and 1881) in (1) the shape of the mantle-aperture, (2) length of the web, and (3) disposition of the suckers. Furthermore, if we utilise Joubin's description, it differs in (4) details of radula, (5) mandibles, (6) length-ratio arm 1 : arm 4. It differs very clearly from *A. pacificus* in (1) radula (*q.v.*), (2) general build and proportions, (3) length of arms (relative and maximum length), and (4) number of gill lamellae. I have excluded from this discussion the very remarkable rotation of the velar area (comparable to that found in *Retroteuthis*), as I am not wholly satisfied as to the origin of this feature.

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PLATE III

Fig. 1. *Graneledone polymorpha*, n.sp. Nat. size. (Type.)

Fig. 2. *Amphitretus thielei*, n.sp. $\times \frac{5}{8}$. (Type.)

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CEPHALOPODA I, OCTOPODA

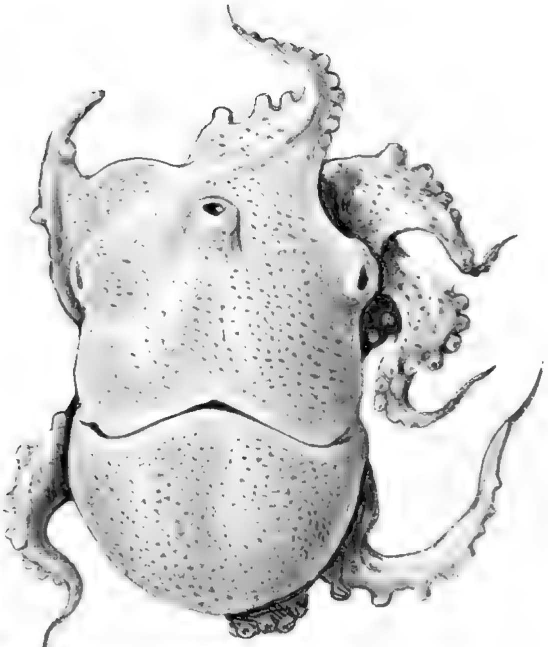
A. J. E. Terzi del.

PLATE IV

Fig. 1. *Alloposus hardyi*, n.sp. Nat. size. (Type.)

Fig. 2. *Benthoctopus* sp. Nat. size.

Fig. 3. *Thaumeledone gunteri*, n.sp. Nat. size. (Type.)



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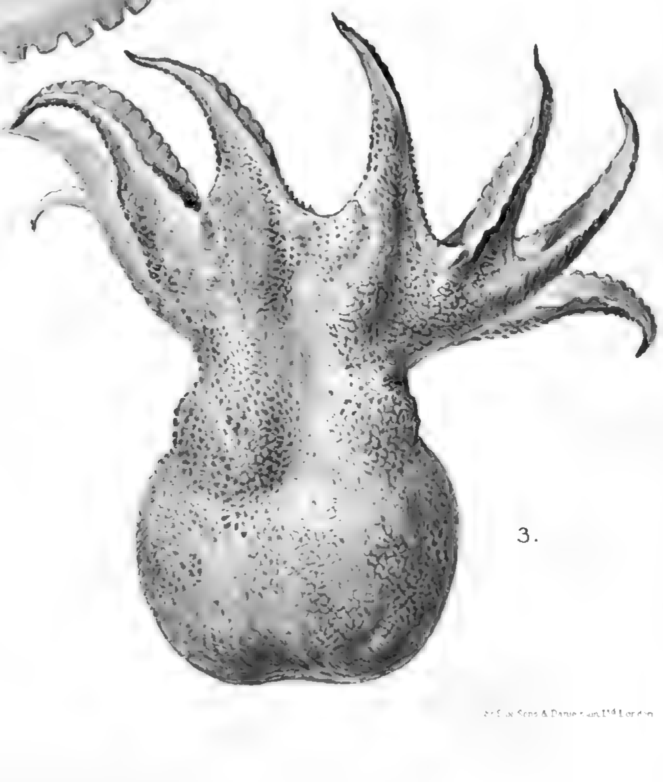

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CEPHALOPODA I, OCTOPODA

PRINTED
IN GREAT BRITAIN
BY
WALTER LEWIS MA
AT
THE CAMBRIDGE
UNIVERSITY
PRESS

DISCOVERY REPORTS

Vol. II, pp. 403–434, plate V, text-figs. 1–5

Issued by the Discovery Committee, Colonial Office, London on behalf of the Government of the Dependencies of the Falkland Islands

THE AGE OF FIN WHALES AT PHYSICAL MATURITY

WITH A NOTE ON MULTIPLE OVULATIONS

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J. F. G. Wheeler, M.Sc.

CAMBRIDGE
AT THE UNIVERSITY PRESS
1930

Price four shillings net

Cambridge University Press
Fetter Lane, London

New York
Bombay, Calcutta, Madras
Toronto
Macmillan

Tokyo
Maruzen Company, Ltd

[*Discovery Reports. Vol. II, pp.* 403–434, *Plate V, text-figs.* 1–5, *December* 1930.]

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CONTENTS

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(Plate V, text-figs. 1–5)

INTRODUCTION

THE determination of age in whales is a question of much scientific interest and economic importance. Hitherto, both in our own work on Blue and Fin whales (1929) and in that undertaken by others (Hinton, 1925; Risting, 1928), the only ground of comparison between individual whales or groups of whales has been that of length. At South Georgia and elsewhere anatomical investigations have shown that whales become sexually mature at lengths which for each species vary within comparatively narrow limits, and the mean values have been used in determining the state of maturity in other whales in which the anatomy could not be studied. There is a possibility, however, that the mean lengths at sexual maturity are not the same in all areas: and, when mature whales are under consideration, average lengths may be very misleading if age is in any way implied.

The enormous size normal to most of the species produces an impression of great age. It is indeed a not unnatural inference that the larger the animal the longer it must live to grow to that size. An estimated length of life of more than a thousand years for whales of the larger species, attributed to Cuvier, is mentioned by Dewhurst (1834, p. 45). The statement appears in a supplement to the Cetacea in a translation of Cuvier's *Règne Animal* (1827), and is apparently due to the translator. Camper (1820), while not committing himself on the subject of age, suggested that as the whales then being caught were not as large as those first taken in the fishery 200 years before, they were not being allowed time to grow to their full size. The idea of a long life and of a relation between growth phases and the span of life appears in G. F. Cuvier's work (1836): "...la durée de leur vie qui doit être considérable, si l'on en juge par analogie avec celle des autres animaux à mamelles, toujours proportionnelles à celle de la croissance qui est proportionnelle elle-même à celle de la taille". Probably much the same opinion was understood if not expressed when the only data concerning whales were obtained from occasional stranded specimens and the reports of whales seen or captured at sea.

Several authors have suggested that the length of life of an animal bears a direct relation to the length of the period of its growth. Lankester (1870) discusses this question, and mentions the 5 to 1 ratio advanced by Flourens (see Grindon, 1863), and the 6 or 7 to 1 ratio previously put forward by Buffon (1775). Flourens states that the Right whale lives for 300 years, but does not give the length of the period of growth or the source of this information. The period of growth was calculated as 20 to 25 years by Dewhurst (1834, p. 23) from notches in the baleen. Later estimates based upon greater practical knowledge include those of Scammon (1874) and Haldane (1905). The former (p. 18) considered that the natural term of life was from 30 to 100 years; the latter (p. 71) that the limit was reached at about 40 years.

Two observations mentioned by Allen (1916) are of interest. He notes that Sibbald refers to a Sulphurbottom whale recognized by fishermen in the Firth of Forth for 20 years before it was cast ashore in 1692, and also that Verrill (1902) mentions a Humpback, known by a peculiar whistle caused by a large barnacle on its blowhole, that appeared regularly in the Bay of Fundy for 20 years.

The age at sexual maturity is known to be two years from birth (Mackintosh and Wheeler, 1929). Economically it is the years following sexual maturity that are important, for from this time onward the female is believed to give birth to a calf not more often than once in every second year, with the result that the whale population will not increase unless the females are allowed to live for at least four years after sexual maturity.

In the previous report (1929) a theory was advanced that the accumulations of scar tissue due to the degeneration of corpora lutea might give a clue to age in females for at least several successive seasons following maturity. Further data on this point were obtained by Messrs F. C. Fraser and G. W. Rayner during seasons 1927–8 and 1928–9, and by Mr F. D. Ommanney and myself during 1929–30. Recently we have found it possible to study also the ankylosis of the vertebral epiphyses with their centra, thus gaining indications of the degree of physical maturity which has been attained; and it is with this work, correlated with that yielded by further study of the corpora lutea, that this paper is mainly concerned.

It may be mentioned that indications of age were again sought for in the ridges of the baleen plates, the structure of bone, and the scars of parasite wounds in the epidermis. Of these the last only was suggestive, but to a very limited and uncertain extent.

While working on the formation of the corpora lutea the question of multiple ovulations, i.e. more than one ovum liberated at one ovulation, appeared to be of some importance. This subject is dealt with in the note on p. 419.

THE AGE OF FIN WHALES AT PHYSICAL MATURITY

THE DETERMINATION OF PHYSICAL MATURITY

The fused or unfused condition of the vertebral epiphyses has been used as an index of physical maturity. The method employed is essentially that described in the *Report* of 1929 on p. 447. While the vertebral column is being turned during the process of stripping away the muscles, the ventral surface is exposed, and by cutting the edges of the vertebrae the state of fusion can be gauged at a glance. Owing to conditions on the flensing plan and the rapidity with which the whales are disposed of, there is rarely time to examine more than three or four vertebrae of each whale, even when using an axe for the work instead of the knife that was tried at Saldanha Bay in 1926.

The presence of a layer of cartilage between epiphysis and centrum is a sign that fusion has not occurred. Towards maturity the cartilage layer becomes very thin, and can sometimes be traced by the cracking away of splinters of centrum from epiphysis or vice versa. After ankylosis a whitish line marks the join, but this eventually disappears and no sign of fusion can be seen. Enumeration of the vertebrae has always been done by counting forward from the 1st caudal, which can easily be recognized because the first of the ventral chevron bones is situated between it and the 2nd caudal. As a routine one vertebrae at the posterior end of the lumbar series was examined (1st caudal, 15th or 14th lumbar), one vertebra in the middle of the lumbar series, one in the posterior thoracic region, and one or two as far forward as possible, *i.e.* the 2nd, 3rd or 4th thoracic. Usually the opposed ends of two vertebrae were cut, but no difference was noticed between the state of fusion at the posterior end of one vertebra and the anterior end of the next.

Although the cervical vertebrae of Fin, Blue and Sei whales are neither wholly nor partly coalesced into a cervical mass as they are in the Right whales and many toothed whales, they are thickly enclosed in connective tissue and, for this reason, it was not found possible to examine them on the plan in the limited time at our disposal.

Following the statement of Flower (1864) that ankylosis begins from the ends of the vertebral column and proceeds towards the middle, the posterior lumbar vertebrae were at first considered diagnostic of complete maturity. Thoracic (dorsal) vertebrae were examined at the same time, however, and it soon became evident that the lumbar epiphyses might be ankylosed while the thoracics were still separated from their centre by thin cartilage.

Certain stages in maturity have been noted, but we have not had the opportunity of examining a complete column in the transition state. In a few whales the lumbar vertebrae were fused while the thoracics were unfused; in some, when fusion had occurred throughout the column, the join was visible in both thoracics and lumbars; in others it could be seen in thoracics only, and in still others no sign of the join could be seen anywhere.

Photomicrographs of the condition in a Fin female of 21·42 m. (No. 3178) are shown in Plate V, figs. 1–3. In this whale pieces of the vertebrae were chipped off with the axe, decalcified in formalin and nitric acid, and sectioned with the freezing microtome. The sections were stained by Schmorl's picrothionin method.

The notes made upon the plan were as follows:

2nd–3rd thoracic	... ...	Epiphyses not fused to centra; separating cartilage layer very thin
15th thoracic–1st lumbar	...	Epiphyses fused to centra. Join visible
13th–14th lumbar	... ...	Epiphyses fused to centra. No sign of join

The cartilage layer, plainly continuous in the anterior thoracic vertebrae, is in process of invasion by bone cells in the posterior thoracic region, and has completely disappeared at the posterior end of the column.

A second series from a Fin female of 22·0 m. (No. 3196) is given in Plate V, figs. 4–6. The vertebrae examined and the notes made on the plan were as follows:

2nd–3rd thoracics ...	...	Epiphyses unfused. Thin cartilage
4th–5th lumbars ...	...	Epiphyses unfused. Thin cartilage
15th lumbar–1st caudal	...	Epiphyses fused

The staining of these sections was not as successful as in the first series. Too long immersion in picric acid had the effect of masking the thionin stain, with the result that the cartilage appears lighter than the bone. The different stages of invasion, however, can still be clearly seen.

Nearly 200 sexually mature female Fin whales were examined, and from these it may be said that, at least as far forwards as the 3rd or 4th thoracic vertebra, ankylosis proceeds from the posterior end of the column. In one only (No. 3181) did the observations suggest that ankylosis might be completed in the posterior thoracic region rather than at the anterior end of this series. The full results are given in the table of records on pp. 422–434. In male Fin whales and all Blue and Sei whales results similar to those given above were found.

It is interesting to note that fusion from the posterior end of the column was observed by Barrett-Hamilton (see Hinton, 1925), who, in his notes on the Humpback (p. 79) mentions "vertebral epiphyses fusing but visible in lumbars, thoracics not fused and thin": among Fin whales (p. 105) and Blue whales (p. 139) he gives several examples of lumbar vertebrae fused while the thoracics were distinct.

On the advice of Sir Sidney Harmer a detailed examination was made of the skeletons of whales and dolphins in the British Museum (Natural History) to determine the state of the cervical epiphyses and vertebrae during the process of ankylosis. More than ninety specimens, including a few seen at the Zoological Museum at Cambridge, were examined, and although in some of them the epiphyses were free throughout and in others physical maturity had been reached and the epiphyses were completely ankylosed,

there were many in the intermediate stage, and Flower's statement that ankylosis begins at both ends of the column was fully confirmed.

No epiphyses were found on the articular surfaces of the atlas, and only a reduced slip of bone on the anterior surface of the axis in one immature specimen. Otherwise the epiphyses could usually be traced from the posterior surface of the axis throughout the column, except sometimes in the extreme caudal vertebrae.

In the most frequently noted intermediate stage the epiphyses were ankylosed from the anterior end of the column to the 1st thoracic, and from the posterior end forward to the 7th or 8th caudal. In one or two specimens anterior ankylosis appeared to have reached as far back as the 4th thoracic, while posterior ankylosis had not proceeded beyond the 1st caudal. No later stages were found, perhaps because of the difficulty of differentiating between the last stages of ankylosis in dried specimens.

We can state, then, that ankylosis commences at both ends of the column and is completed among the anterior thoracic vertebrae. When the epiphyses of these vertebrae are ankylosed, physical maturity has been attained and growth in length ceases.

UNRELIABILITY OF LENGTH AS A MEASURE OF AGE

In the course of the work on whales it has become very evident that length is an uncertain guide to age—that is, relative age—except possibly as an average. This is so even among immature whales, for in these the limit of length overlaps by more than a metre the length of the smallest sexually mature whale. This can be seen in Fig. 1. The smallest sexually mature female Fin whale taken in season 1929–30 was 18·75 m. (No. 2630). It was pregnant. The largest immature female Fin was 21·4 m. (No. 3175).

As might be expected, the lengths at physical maturity show at least equal divergence. A female whale 21·05 m. long (No. 2915), and several very little longer, were physically mature, but females more than 23 m. long have been examined in which the epiphyses were still unfused.

AGE EVIDENCE FROM THE CORPORA LUTEA

Before attempting to discuss the correlation of physical maturity with the age data from the corpora lutea, the origin and fate of the latter must be mentioned and the reasons given for considering that they form an index of age. Part of this work has been put forward in the report on Southern Blue and Fin whales (1929), but further observations have led to a modification of the theory then suggested.

On the expulsion of the ovum the Graafian follicle grows to form a corpus luteum. If fertilization of the ovum follows, the corpus luteum persists practically unchanged, in size at least, until late in gestation. At the end of gestation, or during lactation, it shrinks and grows harder by the reabsorption of the luteal cells and the increasing growth of connective tissue. If, on the other hand, the ovum is not fertilized, the corpus luteum, which is formed exactly as in pregnancy, persists as a functional body for a shorter period. There is no evidence concerning the shrinkage of the corpus luteum

of the unfertilized ovum in whales. In other animals, however, it takes place rapidly, and if the animal is polyoestrous, the corpus has become functionless in time for the ripening of follicles for the next oestrous period (Marshall, 1925, p. 48).

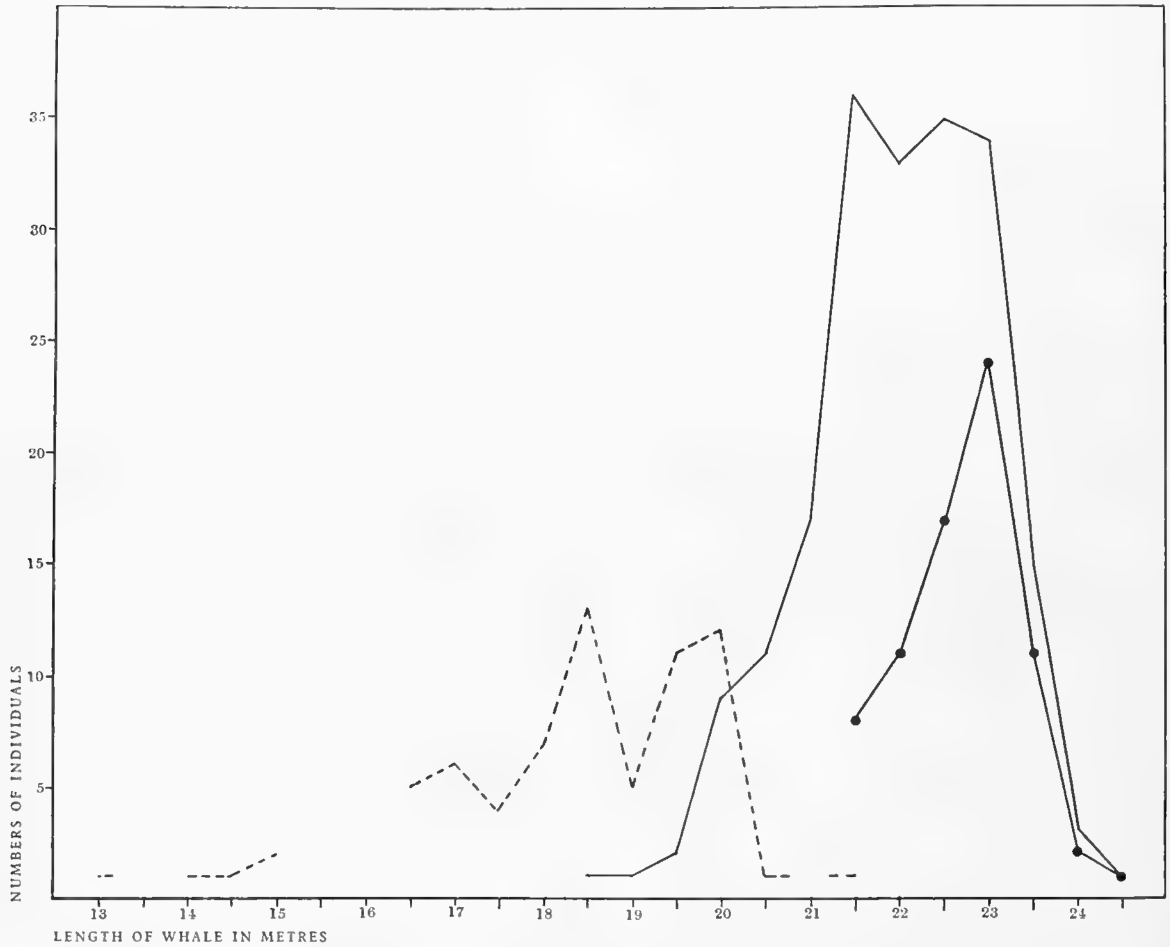

Fig. 1. Fin whales, females: Season 1929–30. Frequency of half-metre lengths.
– – – – Immatured whales. ——— Sexually mature whales. —●— Physically mature whales.

The length of time the corpus luteum can be recognized in the ovaries is discussed by Marshall (1922, p. 147). In the human female the corpus is reduced to an insignificant scar two months after ovulation. In the sow, Corner (1925) found that corpora lutea from one ovulation overlapped those of an earlier ovulation during any one sexual season. Donaldson (1924) gives figures which show definitely the accumulation of corpora lutea with age in the rat (Table X, p. 39). Our own work, as stated on pp. 394–6 of the *Report* (1929), indicates that, by careful examination of the ovaries of whales, traces can be found of all the ovulations that have occurred since the sexual maturity of the animal.

It will be seen later that this view is upheld by the facts of physical maturity. One example may be cited. During season 1929–30 two female Fin whales (Nos. 2765,

2766) were captured and brought to the station on the same day. They were of the same length (22·5 m.), but one possessed twenty-four old corpora lutea and a functional corpus luteum (pseudo-pregnancy); the other had one old corpus luteum and one of pregnancy. In the former, ankylosis of the epiphyses throughout the vertebral column showed that complete physical maturity had been reached; in the latter, thick cartilaginous layers still separated the epiphyses from their centra.

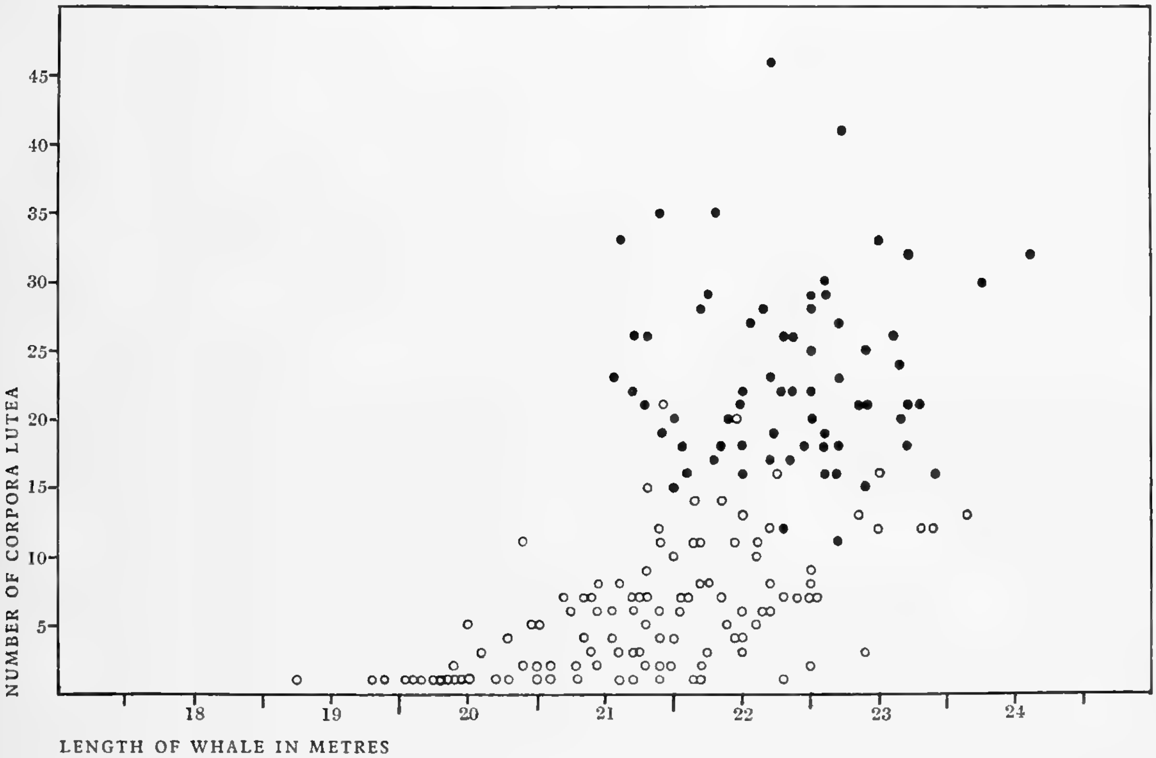

Fig. 2. Fin whales, females: Season 1929–30. Length of whale and number of corpora lutea.
○ Epiphyses not ankylosed throughout column. ● Epiphyses ankylosed throughout.

If the numbers of corpora lutea are plotted against the corresponding lengths of the whales, and the physically mature whales distinguished from those not mature (Fig. 2), it is readily seen that physical maturity bears little relation to length, but does bear a relation to the number of corpora lutea. Indeed, of 105 whales with less than fifteen corpora lutea only two, with eleven and twelve respectively, were physically mature; while of 66 whales with more than fifteen corpora lutea only four, with sixteen, sixteen, twenty and twenty-one, were physically immature.

The age at physical maturity is thus the number of years occupied in the accumulation of fifteen corpora lutea in the ovaries plus the two years that elapse between birth and sexual maturity.

One of the applications of this result is that if the number of corpora lutea has been noted, comparisons can be made between the number of physically mature whales caught in different seasons and areas. This applies particularly to our own previous

work, but should be of value if any future observations are made from floating factories, where the genitalia can often be obtained when there is no opportunity of examining the vertebral column.

When further work has been done on these lines the restriction of comparison to the physically mature whales of successive seasons should lead to a more accurate indication of increase or diminution of stock than is at present available.

The sexual season is limited in some animals to a single oestrous period, and, ovulation taking place at oestrus only, the accumulation of corpora lutea will be slow or rapid according to whether one or more than one ovum is normally shed at this time. In other animals the oestrous (dioestrous) cycle is shorter, and is repeated during the sexual season until pregnancy supervenes or the season ends. In these polyoestrous animals corpora lutea will accumulate rapidly. In some animals again the ovum is not shed unless coition occurs, that is to say, only corpora lutea of pregnancy will be found in the ovaries.

It is obviously of the utmost importance to discover the condition normally existing among whales if there is to be any solid foundation beneath a theory involving the corpora lutea.

The reasons for considering Blue and Fin whales as polyoestrous animals in which ovulation occurs regardless of coition are given in the *Report* (1929) on p. 390. It was there shown that, although foetuses are sometimes lost at sea, and perhaps occasionally very early stages are missed in spite of thorough search, there are too many apparent pregnancies in which no foetus can be found to be accounted for in any way other than by ovulation.

This view has received support from observations during 1929–30. Thirteen apparent ovulations have been noted. The size and condition of the uterus in these whales did not suggest the presence of a foetus, although little reliance can be placed on measurements and observations of congested condition in an organ so capable of rapid recovery as the uterus. When a foetus has been present some indication of the occurrence can usually be found. During this season three foetuses are known to have been slipped at sea, and one of them, about 0·2 m. long (No. 2753), was discharged in its membranes from the parent whale upon the deck of the catcher that was towing it[1].

Whales have been recorded in which two or more ova have been liberated at the same time, but they are too few to form a serious exception to the rule of normal behaviour, which is the shedding of a single ovum at each ovulation. (See note on Multiple Ovulations on p. 419.)

That ovulation takes place without the stimulus of coition is now almost beyond doubt. The high percentage of ovulations at South Africa (Saldanha Bay, 1926) and the comparatively large number of ovulations recorded from South Georgia suggest this condition. The only direct evidence is the capture this season of a Fin female with

[1] Whales are towed alongside the catcher tail first and always float ventral side uppermost. Internal decomposition and extra pressure during stormy weather would be sufficient to cause the discharge of the foetus. On the flensing plan foetuses are sometimes blown two or three yards from the parent.

one old corpus luteum in the ovaries, immature mammary glands, and an unbroken vaginal band (No. 3070). A similar whale was reported in 1925.

Fin and Blue whales are thus polyoestrous animals in which ovulation is spontaneous, one ovum is discharged at a time, and all ovulations leave a permanent record in the ovaries. The question now arises whether something cannot be done towards the estimation of the actual age from the number of corpora lutea.

It has been noticed this season, as in previous seasons, that certain numbers of corpora lutea appear to be much more frequent than other numbers. An explanation of this fact was attempted in 1929, and the theory of age, fully explained below, was briefly outlined at the same time (p. 450).

In polyoestrous animals with a definite sexual season, the number of ovulations in any one season depends upon the occurrence of pregnancy within the limits imposed by the season itself. In social animals like whales, that live in communities or schools and undertake extensive migrations more or less simultaneously at certain times, one would expect to find, at least for one or two seasons after sexual maturity, that the experience of all had been somewhat similar, and that circumstances or conditions that had affected one had affected others in the same way. This certainly applies to the course of migration. There would be no "Fin years" or "Blue years" at South Georgia (seasons when one species appears in great numbers while the other is practically absent) if conditions affecting migration did not affect the whole herd.

Take then, for example, a group of whales in their first sexual season. At the close of the season the minimum number of corpora lutea will be one (corpus luteum of pregnancy) and the whale will be pregnant, the maximum will represent the number of dioestrous cycles that are possible during the season. If, in the majority of these whales, fertilization of the ovum for some reason does not occur for one or more oestrous periods, there will be a majority of whales having the same number of corpora lutea in the ovaries; that is, there will be traces of a certain number of ovulations and a corpus luteum of pregnancy. In the following season these whales will be lactating, while a fresh group is becoming mature. This fresh group may undergo the same experience as the previous whales or it may not, but the number of corpora lutea cannot exceed the maximum which is limited by the season.

As gestation and lactation occupy most of two years, it is during their third season that the first whales again experience a sexual season and the number of corpora lutea again increases. The second group is now lactating, so the number of corpora lutea remains stationary, and a third group is verging upon maturity. In the following year the first group is again lactating, the second ovulating, the third lactating, and a fourth is becoming mature.

Thus, in representative samples from one area, the frequency of the numbers of corpora lutea will show a succession of nodes or peaks marking the increase in numbers every two years.

The graph of the frequency of corpora lutea for season 1929–30 at South Georgia is shown in Fig. 3. Peaks at one, seven, and eleven are clear, and there are indications

of others at eighteen and twenty-one. The whales can be grouped round each of these peaks as follows: Group I, whales with one, two, three or four corpora lutea; Group II, whales with five to nine; Group III, with ten to fourteen; Group IV, with fifteen to nineteen; Group V, with twenty to twenty-four.

We have thus in the number of corpora lutea an indication of the age of any female Fin whale up to eight years from sexual maturity; and because each group is composed mainly of pregnant and lactating whales or of resting whales one year older, we can obtain a rough idea of the number of each age caught during the season from the number of whales in each group as indicated by the frequency chart.

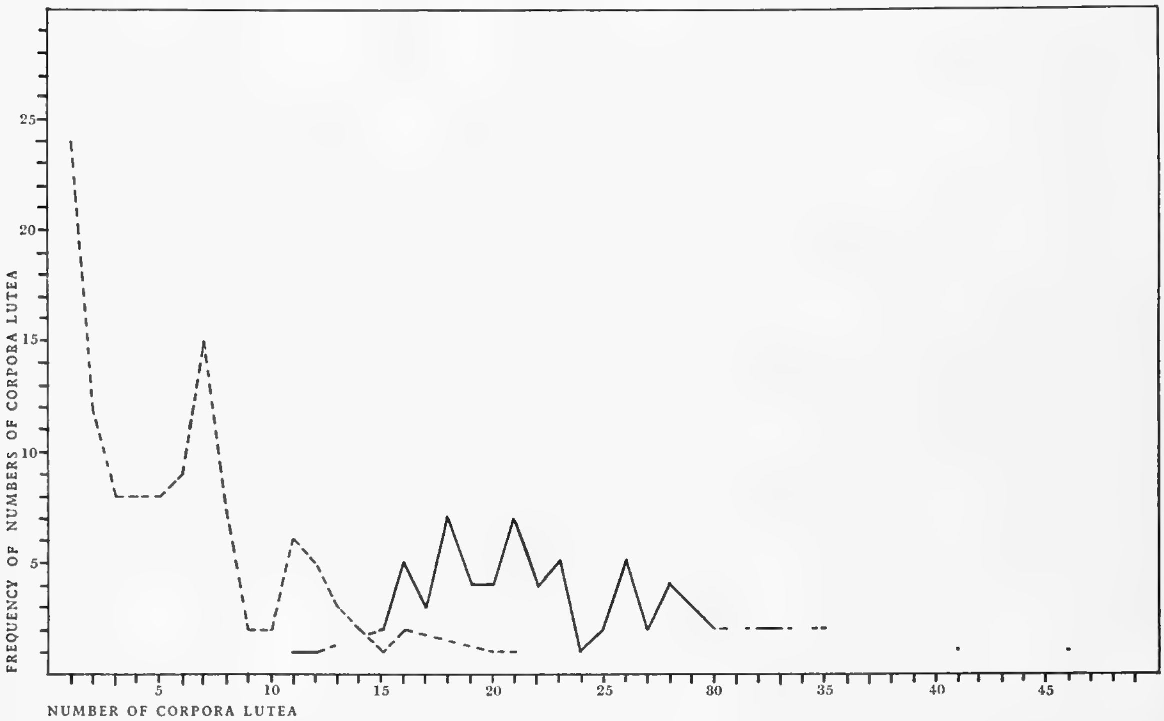

Fig. 3. Fin whales, females: Season 1929–30. Frequency of numbers of corpora lutea.

– – – – Vertebral epiphyses not ankylosed throughout column.

———— Vertebral epiphyses ankylosed throughout column.

The assumption has here been made that pregnancy recurs every two years. That this is in all probability normal behaviour is shown in the *Report* (1929, p. 431) from consideration of the percentage of pregnant and resting whales. During 1929–30 pregnant, lactating and resting whales constituted 64, 17 and 12 per cent respectively of the catch of mature females. The remaining 7 per cent were ovulating. The percentage of pregnant whales is rather high—theoretically it should be 50 per cent—but allowing for possible segregation and seasonal variation the figures point to a recurrent pregnancy at intervals of two years.

In several resting whales the size and condition of the mammary glands showed that lactation had not long ceased, and seven whales from a total of 199 were pregnant

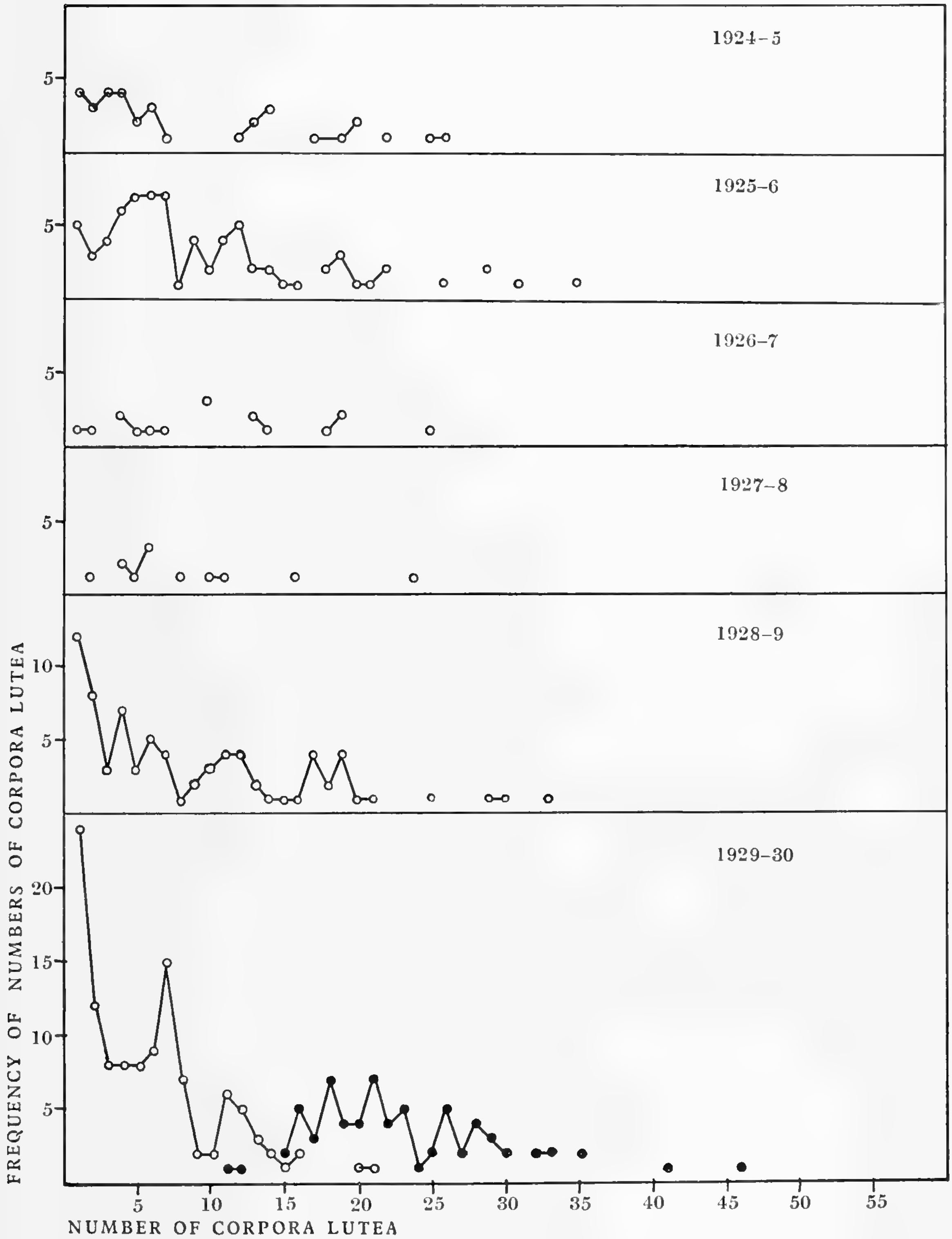

Fig. 4. Fin whales, females: Frequency of numbers of corpora lutea for six seasons at South Georgia.

and lactating at the same time. In one lactating whale ovulation without subsequent fertilization had occurred. These pregnant and lactating, or ovulating and lactating whales suggest either that lactation is sometimes unduly prolonged, or that post-partum ovulation may sometimes take place. If the latter is the true explanation, the interval between successive births in these whales is one year instead of two.

In Fig. 4 the frequency graphs for six seasons at South Georgia can be compared. In the two previous "Fin years" (1925–6; 1928–9) a grouping similar to that of 1929–30 can be recognized, although the peaks alter their position within the groups according to the number of unsuccessful ovulations that was most frequent in that particular season.

It will be noticed in the previous work on the frequency of the corpora lutea (*Report*, 1929, p. 451) that Group I included the present Groups I and II. The present Group I with a maximum at one was not evident because, in two of the three seasons reported upon, the early part of the season was missed, and it can be shown by the incidence of pregnant whales with a single corpus luteum that the earliest pregnancies of the season arrive early at South Georgia. During this season there were eight single corpus luteum pregnancies in November (thirty-five mature whales), four in December (eighty-one mature whales), five in January (seventy-six mature whales), one in February (twenty-nine mature whales), and none in March. Last season there were four in October (thirty-one mature), two in January (forty-two mature), and one in February (fifty mature). From the single functional corpus luteum it is evident that these whales had been fertilized at the first ovulation of the season.

There is a noticeable difference between Group I and all the subsequent groups in that the greatest frequency occurs at the beginning rather than near the middle; in other words, that in the first sexual season the majority of whales become pregnant at the first ovulation, while in subsequent seasons unsuccessful ovulations usually precede pregnancy. A possible explanation is that whales nearing the time of maturity tend to stay near the breeding areas, or, at any rate, do not make a long southward migration, and they are thus the first to be impregnated, while the older whales arrive from the south somewhat later, after one or more ovulations not usually fertilized.

In Fig. 5 the figures for 393 mature Fin females—the total catch since 1924–5—are combined, and it can be seen that, notwithstanding the overlapping that must necessarily occur, the grouping is still evident.

While it is not suggested that the groups in themselves give more than an indication of difference in age of a number of whales, some idea of the amount of overlap between the groups can be gained in the following way. There are certain whales whose age can be ascertained on anatomical grounds. Thus whales pregnant with one functional corpus luteum are naturally in their first year from sexual maturity, while lactating whales with one corpus luteum must be in their second year. When more than one corpus luteum is present the state of the mammary glands has to be taken into account; for if the gland is immature then unfertilized ovulations have occurred during the first season with or without a later successful ovulation depending on whether the whale is pregnant or not.

From the mature females of 1929–30 there are forty in which the age can be determined in this way. Thirty-five of these belong definitely to the first or second year from sexual maturity, i.e. they constitute Group I of the frequency graph, and five are definitely in their third year (Group II). Now there are fifty-two whales with one, two, three or four corpora lutea (Group I) in the frequency graph (Fig. 3). Thus the overlap from Group II is seventeen, of which five have already been traced.

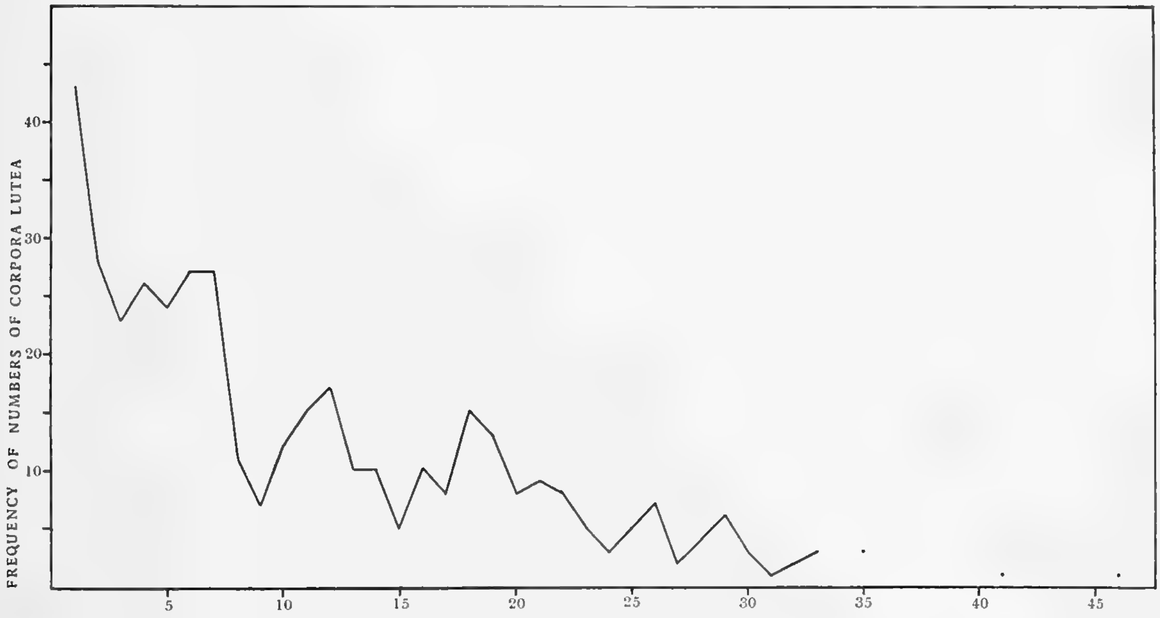

Fig. 5. Fin whales, females. Frequency of numbers of corpora lutea. All records from South Georgia since 1924–5.

CORRELATION OF PHYSICAL MATURITY DATA WITH AGE EVIDENCE FROM CORPORA LUTEA

In Fig. 3 the physically immature whales are distinguished from the mature, and it is evident that the change takes place between Groups III and IV. Therefore female Fin whales become physically mature between four and six years after sexual maturity, that is, between six and eight years from birth.

Although this early maturity agrees with the very rapid bodily growth that is known to occur before sexual maturity, it does not suggest very long life. Whether the length of life can ever be more than a subject for speculation is doubtful and, perhaps, for economic purposes the knowledge is not necessary. At least one whale caught this season had attained the age of twenty years (No. 2815), if the average increase in the number of corpora lutea every two years is taken as four. No sign of a climacteric or diminution of fecundity appeared in the ovaries of any whale, not even in those of the whale mentioned above which possessed forty-six corpora lutea. Nevertheless the largest size and greatest weight of ovary was found in whales with eighteen to twenty corpora lutea, which indicates that after about ten years the reproductive prime is over.

CONCLUSIONS SUMMARIZED

The conclusions advanced in this paper may be summarized as follows:

1. Ankylosis of the epiphyses starts from both ends of the vertebral column, but anteriorly it does not proceed much beyond the cervical series. Ankylosis is completed among the anterior thoracic vertebrae.

2. Complete ankylosis—that is, physical maturity—bears little relation to length, but is found when more than fifteen corpora lutea are present in the ovaries.

3. All ovulations are permanently recorded in the ovaries.

4. Because whales act collectively the number of unfertilized ovulations before pregnancy tends to be the same in any one season, and this manifests itself in the greater frequency of certain numbers of corpora lutea than others.

5. Each peak of the frequency graph represents an age group at an interval of two years from the one previous to it.

6. There are three peaks in the frequency graph before the physically immature whales give place to the mature. This indicates that physical maturity is attained when whales are from six to eight years of age.

7. No signs of a climacteric have been observed in whales up to twenty years of age, but there appears to be a sexual "prime" at ten years, after which the size and weight of the ovaries diminish.

NOTE ON MULTIPLE OVULATIONS

Three of the female Fin whales captured during 1929–30 possessed more than one apparently functional corpus luteum in the ovaries.

No. 2798 was captured in December. It had twin foetuses, a male of 1·04 metres and a female of 1·06 metres, and in one of the ovaries three large corpora lutea, all with the characteristics of the functional corpus luteum of pregnancy, were found. The sizes, measured in three directions at right angles, were as follows: 13 × 15 × 5·5 cm., 13 × 14 × 7 cm., 8·5 × 7 × 7 cm. The tissue of each was soft, somewhat yellow, and stained deeply with both Nile Blue and Osmic acid. Obviously three ova had been shed at one ovulation and two of them had been fertilized.

No. 2815 was brought to the station three days later. No foetus was present but there were two corpora lutea in one ovary and one in the other. These appeared to be functional from their structure and staining reactions. The sizes were 11·5 × 12·5 × 4 cm., 5·5 × 4 × 2·2 cm., 2·2 × 4·5 × 4·5 cm.

In whale No. 2874 a male foetus was present, 0·41 metres long, and in the ovaries there were two apparently functional corpora lutea, one measuring 19 × 16·5 × 7 cm., the other 8·5 × 6·5 × 4 cm.

Among the whales examined by Messrs Fraser and Rayner in season 1928–9, one Fin whale possessed male twins of 3·72 and 3·67 metres. There were two large functional corpora lutea, one in each ovary, measuring 15 × 15 × 8 cm., 15 × 14 × 12 cm.

The above observations show that a very small percentage of whales liberate several ova at one ovulation, and thus provide an explanation of the multiple foetuses occasionally reported.

It is curious that when three ova are shed and two are fertilized, two corpora lutea remain large while the third dwindles; that when two ova are shed and both are fertilized, the corpora lutea are both of large size; while if two ova are shed and only one is fertilized only one corpus luteum maintains its size.

These facts suggest a close and somewhat exclusive relation between corpus luteum and foetus. If two ova are fertilized then two corpora lutea will remain functional, if one foetus is developing then one corpus luteum is sufficient. Perhaps, indeed, the corpus luteum reflects the fate of its own released ovum.

Multiple foetuses have been reported from a number of localities in both the Northern and Southern Hemispheres. Haldane (1910, p. 117) gives the lengths of six foetuses from a Common Rorqual taken off Iceland, but does not record the sexes or details of the ovarian condition (see also Collett, 1911–12). Seven foetuses were taken from a Blue Whale at South Georgia in 1924–5 and the lengths, weights and sexes were reported in the *Norsk Hvalfangsttidende* (Risting, 1925, pp. 98, 99) where reference

is made to multiple foetuses in other species. It has been suggested that, when differences exist between the lengths of the foetuses, two or more successive ovulations are indicated, and the differences in length have been used as a measure of the interval between ovulations (Hinton, 1925, p. 124). Such a theory is very speculative, because the occurrence of multiple foetuses is abnormal and differences, especially in size, may be expected. In consequence this question is likely to remain unanswered until records are obtainable of the condition of the ovaries in addition to the sizes of the foetuses.

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TABLE OF RECORDS

FIN WHALES, FEMALES: SOUTH GEORGIA, 1929–30

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus, pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined			State of epiphyses
										Thoracic	Lumbar	Caudal	
1929 4 Oct.	2550	18·67	0	0	—	9·0	—	—	Immature	—	—	—	—
4 ,,	2552	23·40	1	11	18·0	—	0	4·0	Resting	—	12th	—	Not ankylosed
4 ,,	2553	22·60	1	23	—	34·0	0·86 Male	6·0	Involuted	—	—	—	—
11 ,,	2557	22·60	1	15	—	20·0	0·41 Female	9·0	Involuted	6th 7th 8th 9th 13th 14th	8th 9th 13th 14th	—	Ankylosed. No sign of join
16 ,,	2561	12·9	0	0	—	5·5	—	1·4	Immature	—	—	—	—
16 ,,	2564	20·9	1	2	19·0	19·0	0	8·5	Involuted	7th 8th	8th 9th	—	Not ankylosed. Thick cartilage
17 ,,	2566	17·1	0	0	—	4·5	—	2·0	Immature	10th 11th	—	—	Not ankylosed
18 ,,	2568	22·73	1	40	—	45·0	4·4 Female	15·0	Involuted. Yellow fluid present	11th 12th	7th 8th	—	Ankylosed. No sign of join
19 ,,	2569	23·3	1	20	28·0	22·0	1·04 Male	6·0	Involuted	8th 9th	8th 9th	—	Ankylosed. No sign of join
20 ,,	2572	20·4	1	1	21·0	—	0	—	—	—	—	—	—
21 ,,	2575	22·1	1	9	39·0	28·0	0·66 Male	7·0	Involuted	6th 7th	7th 8th 13th 14th	—	Not ankylosed. Cartilaginous layers least in 13th and 14th lumbar
24 ,,	2581	22·6	0	30	21·0	23·0	—	10·0	Involution nearly complete	7th 8th	9th 10th	—	Ankylosed. Join just visible in thoracics
25 ,,	2582	22·6	1	28	28·5	31·0	0·265 Male	11·5	Involuted	8th 9th 13th 14th	10th 11th	—	Ankylosed. Join just visible in thoracics
27 ,,	2585	22·5	0	22	16·0	22·0	—	22·0	Lactating	5th 6th 9th 10th	8th 9th	—	Ankylosed. No sign of join
28 ,,	2587	22·7	1	22	30·0	22·0	0·68 Male	8·0	Involuted	9th 10th	9th 10th	—	Ankylosed. Join visible in thoracics
28 ,,	2592	22·7	1	10	58·0	39·0	1·6 Female	4·5	Involuted	8th 9th	9th 10th	—	Ankylosed. No sign of join
28 ,,	2594	21·8	1	16	36·0	28·0	0·86 Male	4·0	Involuted	8th 9th	8th 9th	—	Ankylosed. Join visible in 6th and 7th cervicals
28 ,,	2595	22·3	1	11	—	—	1·5–2·0 (decomposed)	6·0	Involuted	—	6th 7th	—	Ankylosed. No sign of join
28 ,,	2596	22·15	1	27	23·0	24·0	0·275 Male	7·0	Involuted	4th 5th 8th 9th	6th 7th	—	Ankylosed. No sign of join
29 ,,	2599	20·1	1	2	33·0	21·0	0·45 Female	3·0	Immature	5th 6th	7th 8th	—	Not ankylosed
29 ,,	2601	21·2	1	9	58·0	28·0	1·23 Male	4·5	Involuted	—	—	—	—
1 Nov.	2603	21·3	1	4	50·0	—	0·72 Female	5·0	Involuted	—	—	—	—
3 ,,	2611	22·9	1	14	60·0	41·0	1·42 Female	5·0	Involuted	9th 10th	8th 9th	—	Ankylosed. Join visible in thoracics
3 ,,	2614	19·9	1	0	42·0	18·0	0·59 Female	2·3	Immature	—	—	—	—

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus, pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined: Thoracic	Vertebrae examined: Lumbar	Vertebrae examined: Caudal	State of epiphyses
1929 3 Nov.	2615	21·9	1	19	45·0	—	0·88 Female	6·6	Involuted	8th 9th	7th 8th	—	Ankylosed. Join visible in thoracics
3 ,,	2616	21·7	1	1	16·5	14·5	0·185 Male	2·8	Immature	8th 9th	10th 11th	—	Not ankylosed
3 ,,	2617	19·3	0	0	—	10·0	—	3·8	Immature	7th 8th	10th 11th	—	Not ankylosed. Thick cartilage layers
4 ,,	2619	18·9	0	0	—	6·5	—	4·0	Immature	8th 9th	8th 9th	—	Not ankylosed. Thick cartilage layers
4 ,,	2621	21·3	1	4	54·0	27·0	1·0 Female	—	—	6th 7th 11th 12th	9th 10th	—	Not ankylosed. Thin cartilage layers in lumbars
4 ,,	2625	22·2	1	16	42·0	32·0	1·42 Male	5·5	Involuted	9th 10th	5th 6th	—	Ankylosed. Join visible in thoracics
5 ,,	2627	22·5	0	28	25·0	26·0	—	8·0	Involution almost complete	7th 8th 14th 15th	8th 9th	—	Ankylosed. No sign of join
5 ,,	2628	23·1	1	25	67·0	32·0	1·28 Female	7·0	Involuted	6th 7th	7th 8th	—	Ankylosed. No sign of join
5 ,,	2630	18·75	1	0	20·0	13·0	0·4 Female	3·0	Immature	9th 10th	10th 11th	—	Not ankylosed. Thick cartilage layers
6 ,,	2635	19·7	0	0	—	10·0	—	3·8	—	—	—	—	—
6 ,,	2636	20·4	1	10	64·0	27·0	1·17 Male	8·0	Involuted	7th 8th 12th 13th	7th 8th	—	Not ankylosed. Thin cartilage layers
7 ,,	2639	22·0	1	17	50·0	36·0	0·8 Male	7·0	Involuted	8th 9th 14th 15th	9th 10th	—	Ankylosed. No sign of join
7 ,,	2640	24·1	1	31	72·0	23·0	1·66 Female	7·5	Involuted	7th 8th	8th 9th	—	Ankylosed. No sign of join
8 ,,	2643	19·6	1	0	19·0	21·0	0·09 Male	3·3	Immature	7th 8th	8th 9th	—	Not ankylosed. Thick cartilage layers
8 ,,	2644	22·55	1	6	55·0	21·0	1·36 Female	4·0	Involuted	8th 9th	7th 8th	—	Not ankylosed. Thin cartilage layers
8 ,,	2645	22·9	0	25	18·0	15·0	—	7·0	Involuted	8th 9th	10th 11th	—	Ankylosed. Join just visible in thoracics
8 ,,	2647	21·1	—	—	—	—	—	—	—	—	—	—	—
11 ,,	2650	22·3	1	2	—	—	1·42 Male	9·0	Involuted	8th 9th 11th 12th	8th 9th	—	Not ankylosed. Thin cartilage in lumbars
16 ,,	2654	23·75	1	29	50·0	29·0	0·65 Male	5·5	Involuted	6th 7th	9th 10th	—	Ankylosed
16 ,,	2656	22·22	1	18	23·0	25·0	0	8·0	Involuted	6th 7th	14th 15th	—	Ankylosed
16 ,,	2660	21·8	1	34	28·0	29·0	0	9·5	Involuted	7th 8th	8th 9th	—	Ankylosed. No sign of join
18 ,,	2661	19·65	1	0	39·0	31·0	1·09 Female	3·0	Immature	—	—	—	—
18 ,,	2663	22·25	1	15	60·0	25·0	1·42 Male	7·5	Involuted	6th 7th	10th 11th	—	Almost ankylosed. Very thin cartilage layers in thoracics
21 ,,	2669	21·4	1	5	52·0	29·0	0·98 Male	6·0	Involuted	7th 8th	11th 12th	—	Not ankylosed
21 ,,	2670	22·3	1	25	26·0	22·0	0	6·5	Involuted	6th 7th	5th 6th	—	Ankylosed
21 ,,	2671	22·6	1	18	64·0	34·0	1·55 Male	6·3	Involuted	5th 6th 11th 12th	7th 8th	—	Ankylosed. Join visible in thoracics
26 ,,	2678	19·75	1	0	14·0	10·0	0	2·0	Immature	—	—	—	—

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus, pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined: Thoracic	Vertebrae examined: Lumbar	Vertebrae examined: Caudal	State of epiphyses
1929 27 Nov.	2685	22·0	1	21	26·0	25·0	0	7·5	Involuted	7th 8th	7th 8th	—	Ankylosed. Join visible in thoracics
29 ,,	2689	19·3	1	0	17·0	45·0	0·8 Female	2·3	Immature	6th 7th 12th 13th	—	—	Not ankylosed. Note: The foetus was found in that cornu of the uterus to which was attached the ovary without the functional corpus luteum
29 ,,	2690	20·5	1	0	36·0	13·0	0·81 Female	2·3	Immature	9th 10th 15th	1st 11th 12th	—	Not ankylosed. Thick cartilage layers
30 ,,	2695	21·6	1	15	80·0	34·0	1·73 Female	7·5	Involuted	7th 8th 11th 12th	9th 10th	—	Ankylosed. Join visible in thoracics
30 ,,	2703	22·5	1	7	58·0	25·0	1·42 Male	4·0	Involuted	7th 8th 12th 13th	10th 11th	—	Thoracics not ankylosed. Thin cartilage present. Lumbars ankylosed
2 Dec.	2711	20·3	1	0	38·0	27·0	1·26 Female	3·0	Immature	8th 9th	2nd 3rd 10th 11th	—	Not ankylosed. Thick cartilage layers
2 ,,	2712	23·2	1	20	81·0	32·0	0·98 Female	6·5	Involuted	10th 11th	—	—	Ankylosed. No sign of join
4 ,,	2721	19·0	0	0	—	9·0	—	2·5	Immature	7th 8th	10th 11th	—	Not ankylosed. Thick cartilage
4 ,,	2722	22·3	—	1	—	—	—	7·0	Involuted	4th 5th	15th	1st	Not ankylosed. Thick cartilage
5 ,,	2724	21·2	1	25	20·0	17·0	0·31 Female	24·0	Lactating	7th 8th 15th	1st 11th 12th	—	Ankylosed. No sign of join
6 ,,	2725	21·25	1	6	48·0	37·0	1·23 Female	13·0	Involuted	6th 7th	2nd 3rd 11th 12th 14th 15th	—	Not ankylosed. Cartilaginous layer thinner in lumbars than thoracics
6 ,,	2729	19·5	0	0	—	6·0	—	1·5	Immature	—	—	—	—
6 ,,	2730	19·55	0	0	—	7·5	—	2·0	Immature	—	—	—	—
7 ,,	2732	21·1	1	7	—	—	0·9 Female	6·5	Involuted	8th 9th 13th 14th	11th 12th	—	Not ankylosed in thoracics. Ankylosed in lumbars
7 ,,	2733	22·05	1	26	62·0	23·0	1·19 Female	5·5	Involuted	8th 9th	3rd 4th 11th 12th	—	Ankylosed. No sign of join
7 ,,	2734	21·5	1	9	66·0	27·0	1·64 Male	—	—	6th 7th 12th 13th	10th 11th	—	Not ankylosed. Cartilage layer thinner in lumbars than thoracics
9 ,,	2738	22·7	1	17	67·0	27·0	1·88 Male	7·0	Involuted	6th 7th 13th 14th	11th 12th	—	Ankylosed. Join visible in thoracics
9 ,,	2739	22·85	1	12	—	32·0	1·79 Female	6·5	Involuted	6th 7th 11th 12th	10th 11th	—	Not ankylosed. Thin cartilage
9 ,,	2740	22·0	0	6	19·0	21·0	—	13·0	Involuted	8th 9th	12th 13th	—	Not ankylosed
10 ,,	2741	23·2	1	31	40·0	28·0	0·83 Male	7·0	Involuted	7th 8th	11th 12th	—	Ankylosed. No sign of join

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined			State of epiphyses
										Thoracic	Lumbar	Caudal	
1929 10 Dec.	2745	21·2	1	2	20·0	20·0	0·2005 Male	5·5	Involuted	6th 7th	1st 2nd 14th 15th	—	Not ankylosed
10 ,,	2746	23·4	1	15	23·0	22·0	0·37 Female	6·5	Involuted	9th 10th 14th 15th	—	—	Ankylosed. Join visible
11 ,,	2749	23·5	1	3 (?)	—	—	2·83 Male	6·5	Involuted	8th 9th 11th 12th	6th 7th	—	Ankylosed. No sign of join. Note: Whale very rotten
13 ,,	2753	20·5	1	1	31·0	30·0	0·2 (?)	3·0	Immature	8th 9th	15th	1st	Not ankylosed
14 ,,	2755	22·7	1	22	—	—	1·98 Female	9·0	Involuted	3rd 4th 8th 9th 12th 13th	4th 5th	—	Ankylosed. Join visible in anterior thoracics
14 ,,	2757	22·2	1	22	71·0	28·0	1·0 (?)	22·5	Lactating	4th 5th 8th 9th	3rd 4th	—	Ankylosed. Join visible in thoracics. Note: Foetal membranes found.
14 ,,	2759	19·9	1	1	39·5	29·0	0·6 Male	2·0	Immature	2nd 3rd 11th 12th	13th 14th	—	Not ankylosed. Thick cartilage
15 ,,	2761	21·4	1	11	42·0	24·0	0·6 Male	7·0	Involuted	1st 2nd 13th 14th	—	—	Not ankylosed
15 ,,	2765	22·5	1	24	16·0	15·0	0	12·0	Involution almost complete	3rd 4th 12th 13th	7th 8th	—	Ankylosed. Join visible in 3rd and 4th thoracics
15 ,,	2766	22·5	1	1	76·0	41·0	1·87 Female	2·0	Immature	2nd 3rd 12th 13th	14th 15th	—	Not ankylosed. Thick cartilage
15 ,,	2767	22·7	0	23	18·0	22·0	—	8·0	Involuted	4th 5th 10th 11th	—	—	Ankylosed. Join visible in anterior vertebrae
16 ,,	2769	20·9	1	6	50·0	25·0	1·0 Male	5·0	Involuted	4th 5th 12th 13th	11th 12th	—	Not ankylosed. Thick cartilage layers
16 ,,	2771	21·65	1	13	39·0	22·0	0·67 Male	6·5	Involuted	3rd 4th 15th	1st 14th 15th	—	Thoracics and first lumbar not ankylosed. Posterior lumbars ankylosed
16 ,,	2772	22·85	0	21	15·0	17·0	—	27·0	Lactating	3rd 4th 7th 15th	1st 10th 11th	—	Ankylosed. Joins visible as far as first lumbar
16 ,,	2773	23·15	1	23	75·0	45·0	1·31 Male	6·0	Involuted	2nd 3rd 7th 8th	7th 8th	—	Ankylosed. Join visible in anterior thoracics
16 ,,	2775	21·95	1	10	85·0	45·0	2·19 Male	7·0	Involuted	3rd 4th 10th 11th	14th 15th	—	Not ankylosed. Thin cartilage in lumbars

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus, pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined: Thoracic	Lumbar	Caudal	State of epiphyses
1929 16 Dec.	2776	21·2	1	0	53·0	28·0	1·27 Female	3·0	Immature	2nd 3rd 13th 14th	—	1st 2nd	Not ankylosed
16 ,,	2778	20·0	1	0	45·0	25·0	1·12 Male	2·0	Immature	2nd 3rd 13th 14th	14th 15th	—	Not ankylosed
16 ,,	2780	21·2	1	6	43·0	27·0	1·0 Male	6·0	Involuted	4th 5th	1st 2nd 11th 12th	—	Not ankylosed
17 ,,	2789	23·0	1	32	63·0	35·0	1·0 Female	7·0	Involuted	3rd 4th 11th 12th	—	—	Ankylosed. Join visible in anterior thoracics
18 ,,	2791	21·85	1	6	65·0	23·0	1·6 Female	5·0	Involuted	3rd 4th 11th 12th	11th 12th	—	Thoracics not ankylosed. Thin cartilage. Lumbars ankylosed. Join visible
18 ,,	2797	22·7	1	26	85·0	64·0	2·77 Male	9·5	Involuted	3rd 4th	5th 6th	—	Ankylosed. Join visible in thoracics
18 ,,	2798	21·57	3	15	65·0	38·0	1·06 Female 1·04 Male	5·0	Involuted	3rd 4th 12th 13th	—	—	Ankylosed. Join visible
18 ,,	2801	21·05	1	5	33·0	14·0	0·51 Female	4·5	Involuted	3rd 4th 11th 12th	14th 15th	—	Not ankylosed. Thick cartilage
19 ,,	2806	21·3	1	14	84·0	55·0	2·32 Male	5·5	Involuted	4th 5th 12th 13th	5th 6th 15th	1st	Thoracics not ankylosed. Thin cartilage. Lumbars ankylosed. Join visible
19 ,,	2810	21·1	1	32	43·0	23·0	0·71 Male	7·0	Involuted	3rd 4th 12th 13th	—	—	Ankylosed. No sign of join
19 ,,	2811	20·8	—	—	—	—	—	5·0	—	—	—	—	Note: Very rotten. One of later lumbar vertebrae with unfused epiphyses
20 ,,	2813	20·85	1	3	46·0	22·0	0·91 Male	4·5	Involuted	4th 5th	6th 7th 15th	1st	Not ankylosed
21 ,,	2814	21·3	1	25	67·0	42·0	2·3 Male	8·0	Involuted	3rd 4th 8th 9th	—	—	Ankylosed. No sign of join
21 ,,	2815	22·2	3	43	30·0	25·0	0	5·0	Involuted	5th 6th 12th 13th	—	—	Ankylosed. No sign of join
22 ,,	2819	22·35	1	21	90·0	20·0	2·05 Female	6·0	Involuted	2nd 3rd 11th 12th	—	—	Ankylosed. No sign of join
23 ,,	2821	22·7	0	16	17·0	18·0	—	8·0	Involuted	3rd 4th 11th 12th	—	—	Ankylosed. No sign of join
23 ,,	2826	21·95	1	7	55·0	43·0	1·47 Male	7·0	Involuted	—	—	—	—
23 ,,	2827	20·7	—	—	—	—	1·9 Female	6·0	Involuted	2nd 3rd	4th 5th 15th	1st	Not ankylosed. Note: Whale very rotten
24 ,,	2828	16·45	0	0	—	7·0	—	1·5	Immature	—	—	—	—

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus, pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined: Thoracic	Lumbar	Caudal	State of epiphyses
1929 24 Dec.	2830	21·85	0	18	19·0	23·0	—	7·0	Involuted	1st 2nd 11th 12th	—	—	Ankylosed. No sign of join
24 ,,	2831	21·55	1	5	66·0	24·0	1·4 Female	4·5	Involuted	3rd 4th 12th 13th	7th 8th 15th	1st	Not ankylosed. Thick cartilage
24 ,,	2835	21·9	1	4	45·0	21·0	0·83 Male	7·0	Involuted	4th 5th 12th 13th	15th	1st	Thoracics not ankylosed. Lumbars and caudal ankylosed. Join visible
24 ,,	2836	19·8	1	0	28·0	19·0	0·43 Male	3·2	Immature	2nd 3rd 10th 11th	4th 5th 15th	1st	Not ankylosed. Thick cartilage
24 ,,	2837	21·3	1	1	31·0	13·0	0·6 Male	5·5	Involuted	7th 8th	14th 15th	—	Not ankylosed. Thick cartilage
24 ,,	2838	21·2	0	22	13·0	13·0	—	25·0	Lactating	2nd 3rd 9th 10th	—	—	Ankylosed. No sign of join
24 ,,	2839	20·95	1	1	26·0	18·0	0·39 Female	3·5	Immature	5th 6th 14th 15th	1st 2nd 3rd 15th	1st	Not ankylosed. Thick cartilage
24 ,,	2840	19·65	0	0	—	8·0	—	2·0	Immature	—	—	—	—
24 ,,	2841	19·1	0	0	—	8·0	—	2·5	Immature	—	—	—	—
24 ,,	2842	21·7	1	27	40·0	24·0	0·61 Male	6·5	Involuted	4th 5th 10th 11th	—	—	Ankylosed. No sign of join
24 ,,	2845	22·1	1	4	68·0	28·0	2·1 Female	3·0	Involuted	8th 9th	10th 11th 15th	1st	Not ankylosed. Thick cartilage
24 ,,	2846	22·65	1	1 (?)	22·0	—	—	—	—	—	—	—	Note: Whale rotten
27 ,,	2851	21·7	0	8	21·0	24·0	—	5·5	Involuted	4th 5th 12th 13th	15th	1st	Thoracics not ankylosed. Thin cartilage in 4 and 5. Very thin in 12 and 13. Lumbars ankylosed
27 ,,	2854	19·85	0	0	—	6·0	—	3·0	Immature	—	—	—	—
27 ,,	2855	17·55	0	0	—	5·0	—	1·5	Immature	—	—	—	—
27 ,,	2856	22·35	1	16	67·0	27·0	1·82 Female	8·0	Involuted	4th 5th 10th 11th	—	—	Ankylosed. Join visible
27 ,,	2857	21·95	1	19	20·0	15·0	0	12·0	Lactating slightly	4th 5th 9th 10th 11th 12th	7th 8th 15th	1st	Thoracics not ankylosed. Thin cartilage. Anterior lumbars ankylosed. Join visible. No sign of join in posterior lumbars
27 ,,	2858	16·9	0	0	—	5·0	—	1·0	Immature	—	—	—	—
28 ,,	2865	21·5	0	15	16·0	16·0	—	25·0	Lactating slightly	3rd 4th 11th 12th	9th 10th	—	Ankylosed. Join visible in thoracics
28 ,,	2866	22·0	1	15	85·0	59·0	2·66 Male	6·5	Involuted	2nd 3rd 8th 9th	—	—	Ankylosed. No sign of join
28 ,,	2868	22·5	1	5 (+?)	—	—	—	5·5	Involuted	3rd 4th 10th 11th	—	—	Ankylosed. No sign of join. Note: Whale rotten

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus, pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined			State of epiphyses
										Thoracic	Lumbar	Caudal	
1929													
29 Dec.	2870	18·45	0	0	—	5·0	—	1·0	Immature	—	—	—	—
30 „	2874	23·0	2	14	27·0	24·0	0·41 Male	7·0	Involuted	2nd 3rd 8th 9th 14th 15th	15th	1st	Thoracics not ankylosed. Very thin cartilage. Lumbars ankylosed. Join visible
30 „	2875	17·7	0	0	—	8·5	—	0·75	Immature	—	—	—	—
30 „	2876	19·3	0	0	—	7·0	—	1·75	Immature	—	—	—	—
30 „	2877	19·1	0	0	—	7·0	—	1·5	Immature	—	—	—	—
30 „	2878	21·7	1	1	58·0	20·0	2·04 Female	4·0	Involuted	1st 2nd	4th 5th 13th 14th	—	Not ankylosed. Thick cartilage in thoracics
30 „	2879	22·4	1	6	68·0	30·0	2·5 Male	5·0	Involuted	2nd 3rd 12th 13th	14th 15th	—	Thoracics not ankylosed. Thin cartilage. Lumbars ankylosed. Join visible
31 „	2883	21·4	1	1	47·0	30·0	0·8 Male	3·5	Involuted	2nd 3rd 11th 12th	15th	1st	Not ankylosed. Thick cartilage in thoracics
31 „	2885	19·25	0	0	—	—	—	4·0	Immature	—	—	—	—
1930													
3 Jan.	2887	18·3	0	0	—	8·0	—	—	—	—	—	—	—
3 „	2888	22·2	0	8	20·0	29·0	—	19·0	Lactating	3rd 4th 10th 11th	1st 2nd 9th 10th 15th	1st	Not ankylosed. Thick cartilage in thoracics
3 „	2889	17·0	0	0	—	4·0	—	1·0	Immature	15th	1st	—	Not ankylosed
4 „	2890	16·7	0	0	—	6·0	—	—	—	—	—	—	—
6 „	2897	20·7	1	6	35·0	19·0	0·69 Male	5·5	Involuted	3rd 4th 10th 11th	14th 15th	—	Not ankylosed
6 „	2900	23·16	0	20	19·0	19·0	—	9·5	Involuted	2nd 3rd 10th 11th	—	—	Ankylosed. Join visible in thoracics
6 „	2903	19·85	1	0	50·0	27·0	1·5 Male	2·0	Immature	1st 2nd	15th	1st	Not ankylosed
6 „	2907	21·3	0	9	17·0	17·0	—	8·5	Involution just complete	2nd 3rd 13th 14th	14th 15th	—	Not ankylosed. Thin cartilage
6 „	2909	21·96	1	3	40·0	30·0	2·08 Female	3·0	Involuted	2nd 3rd 13th 14th 15th	7th 8th 15th	1st	Not ankylosed. Thin cartilage in lumbars
6 „	2910	22·5	1	27	87·0	36·0	3·07 Male	5·5	Involuted	2nd 3rd 11th 12th	—	—	Ankylosed. Join just visible in anterior vertebrae
6 „	2911	19·25	0	0	7·0	8·0	—	2·5	Immature	4th 5th	3rd 4th	—	Not ankylosed. Thick cartilage
7 „	2912	21·85	1	13	70·0	40·0	2·83 Male	5·0	Involuted	3rd 4th 8th 9th 14th 15th	11th 12th	—	Thoracics not ankylosed. Very thin cartilage. Lumbars ankylosed. Join visible
7 „	2915	21·05	1	22	88·0	42·0	2·64 Male	6·5	Involuted	8th 9th	—	—	Ankylosed. Join visible

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus, pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined			State of epiphyses
										Thoracic	Lumbar	Caudal	
1930 7 Jan.	2917	21·1	1	2	19·0	18·0	0·29 Male	3·5	Involuted	14th 15th	1st 2nd 15th	1st	Not ankylosed. Thick cartilage
7 ,,	2923	21·4	1	0	47·0	44·0	1·64 Male	2·0	Immature	3rd 4th 12th 13th	15th	1st	Not ankylosed
8 ,,	2926	21·4	1	34	60·0	33·0	1·27 Female	6·5	Involuted	2nd 3rd 12th 13th	14th 15th	—	Ankylosed. No sign of join
8 ,,	2927	22·2	1	11	87·0	60·0	3·0 Female	6·0	Involuted	3rd 4th 12th 13th	14th 15th	—	Thoracics not ankylosed. Thin cartilage. Lumbars fused. Join visible
8 ,,	2930	20·0	1	4	65·0	45·0	1·95 Female	5·0	Involuted	3rd 4th 10th 11th	14th 15th	—	Not ankylosed. Thick cartilage
11 ,,	2948	20·6	1	1	63·0	29·0	1·23 Male	3·0	Immature	4th 5th 12th 13th	11th 12th 15th	1st	Not ankylosed. Thick cartilage
12 ,,	2951	22·0	1	3	63·0	27·0	1·3 Female	3·5	Involuted	5th 6th 15th	1st 15th	1st	Not ankylosed. Thick cartilage
12 ,,	2954	21·5	0	20	13·0	13·0	—	5·0	Involuted	3rd 4th 11th 12th	—	—	Ankylosed. No sign of join
12 ,,	2956	20·47	0	5	14·0	13·0	—	7·0	Involuted	2nd 3rd 12th 13th	15th	1st	Not ankylosed. Thick cartilage
12 ,,	2958	21·05	1	3	17·0	13·5	0·22 Male	4·0	Involuted	4th 5th	1st 2nd 3rd 4th 15th	1st	Not ankylosed. Thin cartilage in lumbars and caudal
12 ,,	2959	18·0	0	0	—	7·0	—	2·5	Immature	—	—	—	—
12 ,,	2961	19·3	0	0	—	6·5	—	1·5	Immature	—	—	—	—
13 ,,	2966	19·8	0	0	—	10·0	—	3·0	Immature	—	—	—	—
13 ,,	2967	20·5	1	4	75·0	43·0	2·83 Female	4·5	Involuted	2nd 3rd 14th 15th	15th	1st	Not ankylosed. Thick cartilage in thoracics
13 ,,	2970	18·2	0	0	—	6·5	—	2·0	Immature	—	—	—	—
14 ,,	2979	21·9	0	5	18·0	16·0	—	23·5	Lactating	3rd 4th 13th 14th	15th	1st	Not ankylosed. Thick cartilage
14 ,,	2980	22·45	1	17	60·0	40·0	1·4 Male	25·0	Lactating	3rd 4th 13th 14th	—	—	Ankylosed. Join visible
15 ,,	2984	14·1	0	0	—	4·5	—	2·5	Immature	—	—	—	—
15 ,,	2990	22·1	1	10	72·0	44·0	2·03 Male	6·5	Involuted	3rd 4th 13th 14th	15th	1st	Thoracics not ankylosed. Thin cartilage. Lumbars ankylosed. No sign of join
15 ,,	2991	22·0	0	18	17·0	24·0	—	7·5	Involuted	2nd 3rd 11th 12th	—	—	Ankylosed. No sign of join

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus, pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined			State of epiphyses
										Thoracic	Lumbar	Caudal	
1930 15 Jan.	2992	23·2	1	17	87·0	28·0	3·0 Male	7·0	Involuted	1st 2nd 11th 12th	—	—	Ankylosed. No sign of join
17 ,,	2998	20·6	1	0	71·0	30·0	1·73 Female	3·0	Immature	3rd 4th 11th 12th	14th 15th	—	Not ankylosed. Thick cartilage
19 ,,	2999	20·2	1	0	38·5	19·5	0·72 Female	2·5	Immature	3rd 4th	15th	1st	Not ankylosed. Thick cartilage
19 ,,	3000	17·75	0	0	—	4·0	—	1·0	Immature	—	—	—	—
20 ,,	3001	19·6	0	0	—	9·5	—	2·0	Immature	—	—	—	—
21 ,,	3007	21·7	0	11	15·0	28·0	—	7·0	Involuted	4th 5th 13th 14th	15th	1st	Thoracics not ankylosed. Thin cartilage. Lumbars ankylosed. Join visible
22 ,,	3012	17·35	0	0	—	4·5	—	—	—	—	—	—	—
22 ,,	3014	18·35	0	0	—	5·0	—	1·0	Immature	—	—	—	—
22 ,,	3016	21·67	0	11	—	—	—	9·5	Involution just complete	4th 5th 13th 14th	15th	1st	Not ankylosed. Thick cartilage in anterior thoracics
22 ,,	3021	22·0	1	2	18·0	17·0	0·21 Male	4·0	? Immature	1st 2nd 14th 15th	1st 15th	1st	Not ankylosed. Thick cartilage
22 ,,	3022	18·85	0	0	—	9·0	—	1·5	Immature	—	—	—	—
23 ,,	3023	16·6	0	0	—	5·0	—	1·5	Immature	—	—	—	—
23 ,,	3024	16·5	0	0	—	4·5	—	2·0	Immature	—	—	—	—
23 ,,	3025	20·8	0	1	—	15·0	—	17·0	Lactating	2nd 3rd	15th	1st	Not ankylosed. Thick cartilage
23 ,,	3029	18·55	0	0	—	5·0	—	1·0	Immature	—	—	—	—
24 ,,	3030	18·25	0	0	—	6·0	—	—	—	—	—	—	—
24 ,,	3034	21·55	1	6	55·0	32·0	1·74 Male	7·0	Involuted	2nd 3rd 9th 10th	15th	1st	Not ankylosed. Thin cartilage
24 ,,	3036	20·8	0	2	12·0	9·0	—	2·0	Immature	3rd 4th 12th 13th	15th	1st	Not ankylosed. Thick cartilage
25 ,,	3039	18·4	0	0	—	6·0	—	2·0	Immature	—	—	—	—
26 ,,	3045	21·75	1	2	41·0	17·0	0·97 Female	3·0	Immature	—	14th 15th	—	Not ankylosed. Thick cartilage
28 ,,	3049	22·5	1	28	58·0	35·0	1·14 Female	24·0	Lactating	3rd 4th 9th 10th 14th 15th	—	—	Ankylosed. No sign of join
28 ,,	3050	21·75	1	28	67·0	59·0	1·26 Female	20·0	Lactating	3rd 4th 9th 10th 13th 14th	9th 10th	—	Ankylosed. Join visible in thoracics
28 ,,	3053	18·65	0	0	—	5·0	—	1·5	Immature	—	—	—	—
28 ,,	3054	21·4	1	3	79·0	27·0	2·88 Male	5·0	Involuted	9th 10th	14th 15th	—	Not ankylosed. Thick cartilage
28 ,,	3056	16·0	0	0	—	5·0	—	2·0	Immature	—	—	—	—
28 ,,	3057	17·75	0	0	—	—	—	1·5	Immature	—	—	—	—
28 ,,	3058	21·1	0	0	—	—	—	2·5	Immature	—	—	—	—
29 ,,	3063	20·9	1	2	79·0	34·0	2·03 Female	5·0	Involuted	3rd 4th	1st 2nd 15th	1st	Not ankylosed. Thick cartilage

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined			State of epiphyses
										Thoracic	Lumbar	Caudal	
1930													
29 Jan.	3065	19·8	0	0	—	9·0	—	2·5	Immature	2nd 3rd	13th 14th	—	Not ankylosed. Thick cartilage
29 ,,	3066	22·15	0	6	13·0	14·0	—	25·0	Lactating	3rd 4th 11th 12th	15th	1st	Not ankylosed. Thick cartilage
29 ,,	3069	19·4	1	0	47·0	26·0	1·07 Female	2·0	Immature	1st 2nd	15th	1st	Not ankylosed. Thick cartilage
29 ,,	3070	20·3	0	1	8·0	11·0	—	3·0	Immature	—	—	—	—
29 ,,	3073	22·5	1	6	75·0	39·0	3·1 Male	5·5	Involuted	2nd 3rd 8th 9th	13th 14th	—	Thoracics not ankylosed. Thin cartilage. Lumbars ankylosed. Join visible
29 ,,	3074	19·5	0	0	—	10·0	—	2·5	Immature	2nd 3rd 14th 15th	14th 15th	—	Not ankylosed. Thick cartilage
30 ,,	3075	19·87	0	0	—	9·0	—	2·0	Immature	—	—	—	—
30 ,,	3079	22·0	(?)	2 (?)	—	—	2·5 Male	5·0	Involuted	2nd 3rd	1st 2nd 15th	1st 2nd 3rd	Not ankylosed. Thick cartilage. Note: Whale rotten
30 ,,	3082	19·85	0	0	—	—	—	1·5	Immature	—	—	—	—
31 ,,	3085	20·15	0	0	—	—	—	2·0	Immature	—	—	—	—
31 ,,	3089	22·5	0	9	13·0	14·0	—	7·0	Involuted	3rd 4th 12th 13th	10th 11th 15th	1st	Thoracics not ankylosed. Thin cartilage. Lumbars ankylosed. Join visible
31 ,,	3090	22·3	0	7	21·0	23·0	—	7·0	Involuted	4th 5th	1st 2nd 15th	1st	Not ankylosed. Cartilage in thoracics and anterior lumbars thick
31 ,,	3092	22·0	0	2 (?)	—	—	1·8 Male	6·5	Involuted	2nd 3rd 7th 8th	14th 15th	—	Not ankylosed. Cartilage thick in thoracics, thin in lumbars. Note: Whale rotten
31 ,,	3093	23·0	0	3 (?)	—	—	3·4 Female	6·5	Involuted	2nd 3rd 15th	1st 13th 14th	—	Ankylosed. Join visible in thoracics. Note: Whale rotten
31 ,,	3094	18·25	0	0	—	—	—	1·0	Immature	—	—	—	—
1 Feb.	3099	18·2	0	0	—	5·5	—	1·0	Immature	—	—	—	—
2 ,,	3100	17·8	0	0	—	4·5	—	1·0	Immature	—	—	—	—
2 ,,	3102	19·95	1	0	76·0	53·0	2·64 Female	3·5	Immature	7th 8th	15th	1st	Not ankylosed. Thick cartilage
2 ,,	3104	18·16	0	0	—	5·0	—	1·5	Immature	—	—	—	—
2 ,,	3105	21·2	1	5	96·0	62·0	3·8 Male	3·0	Involuted	—	—	—	—
2 ,,	3106	18·3	0	0	—	8·0	—	1·5	Immature	—	—	—	—
2 ,,	3107	21·6	1	6	76·0	—	1·95 Male	6·0	Involuted	4th 5th 12th 13th	—	1st 2nd	Not ankylosed. Thick cartilage
3 ,,	3110	21·6	1	6	85·0	45·0	2·88 Female	5·5	Involuted	2nd 3rd 10th 11th	15th	1st	Not ankylosed. Thick cartilage in thoracics, thin in lumbars
4 ,,	3119	21·3	0	7	25·0	20·0	—	11·0	Involution just complete	4th 5th	7th 8th 14th 15th	—	Not ankylosed. Thick cartilage
5 ,,	3121	22·6	0	18	20·0	20·0	—	17·0	Lactating	3rd 4th 10th 11th	8th 9th	—	Ankylosed. Join visible in thoracics
5 ,,	3122	22·2	0	6	19·0	20·0	—	19·0	Lactating	3rd 4th	15th	1st	Not ankylosed. Thick cartilage in thoracics

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus, pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined			State of epiphyses
										Thoracic	Lumbar	Caudal	
1930 6 Feb.	3123	16·93	0	0	—	—	—	1·0	Immature	—	—	—	—
6 ,,	3124	16·15	0	0	—	6·0	—	1·0	Immature	—	—	—	—
6 ,,	3128	18·5	0	0	—	5·0	—	1·5	Immature	—	—	—	—
11 ,,	3131	13·9	0	0	—	—	—	—	—	—	—	—	—
16 ,,	3134	16·7	0	0	—	5·0	—	—	—	—	—	—	—
16 ,,	3136	21·48	1	1	66·0	47·0	3·0 Male	5·0	Involuted	2nd 3rd 8th 9th	13th 14th	—	Not ankylosed. Thick cartilage
16 ,,	3137	14·65	0	0	—	6·0	—	—	—	—	—	—	—
16 ,,	3138	19·0	0	0	—	8·0	—	2·0	Immature	—	—	—	—
16 ,,	3142	19·05	0	0	—	6·5	—	2·0	Immature	—	—	—	—
17 ,,	3147	22·5	0	22	26·0	26·0	—	20·0	Lactating	3rd 4th 10th 11th	—	—	Ankylosed. Join visible
19 ,,	3150	21·28	0	21	—	—	—	17·0	Lactating	3rd 4th 12th 13th	4th 5th 15th	1st	Ankylosed. Join visible in thoracics
19 ,,	3151	21·2	0	1	—	—	—	2·0	Immature	3rd 4th	1st 2nd 15th	1st	Not ankylosed. Thick cartilage
19 ,,	3154	21·1	0	1	—	—	—	26·0	Lactating	2nd 3rd	3rd 4th 15th	1st	Not ankylosed. Thick cartilage
20 ,,	3156	21·25	0	3	—	—	—	6·5	Involuted	2nd 3rd 13th 14th	15th	1st	Not ankylosed. Thick cartilage
27 ,,	3166	16·3	0	0	—	3·0	—	1·0	Immature	—	—	—	—
28 ,,	3173	19·55	0	1	18·0	20·0	—	6·0	Involuted	2nd 3rd	6th 7th 15th	1st	Not ankylosed. Thick cartilage
28 ,,	3175	21·4	0	0	—	8·0	—	3·0	Immature	3rd 4th	14th 15th	—	Not ankylosed. Thick cartilage
28 ,,	3176	22·9	1	2	38·0	20·0	0·56 Male	5·0	Involuted	3rd 4th	6th 7th 8th 9th 15th	1st 4th 5th	Not ankylosed. Thick cartilage
4 Mar.	3178	21·42	1	20	63·0	57·0	2·42 Male	20·0	Lactating slightly	2nd 3rd 15th	1st 13th 14th	—	Anterior thoracics not ankylosed. Very thin cartilage. 15th thoracic ankylosed, join visible. Posterior epiphyses ankylosed
4 ,,	3181	23·64	1	12	70·0	36·0	2·17 Female	19·0	Lactating	3rd 4th 5th 8th 9th 13th 14th	14th 15th	—	Posterior thoracics not ankylosed. Very thin cartilage. Anterior thoracics apparently ankylosed. Join visible but epiphysis did not crack away from centrum
5 ,,	3184	21·66	0	1	11·0	12·0	—	17·0	Lactating	2nd 3rd 4th	15th	1st	Not ankylosed. Thick cartilage
6 ,,	3186	23·0	0	1 (+?)	—	—	—	9·0	Lactation just over	2nd 3rd 12th 13th	—	—	Ankylosed. Join visible in anterior thoracics. Note: Whale very rotten
7 ,,	3188	21·5	—	4	16·0	17·0	—	26·0	Lactating	2nd 3rd 12th 13th	15th	1st	Not ankylosed. Thick cartilage

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus, pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined: Thoracic	Vertebrae examined: Lumbar	Vertebrae examined: Caudal	State of epiphyses
1930 7 Mar.	3190	20·75	1	5	95·0	50·0	3·88 Male	6·0	Involuted	3rd 4th	5th 6th 15th	1st	Not ankylosed. Thick cartilage
7 „	3191	20·85	—	7	—	12·0	—	10·0	Lactation nearly over	3rd 4th 11th 12th	15th	1st	Not ankylosed. Thick cartilage
8 „	3195	19·2	0	0	—	6·0	—	1·5	Immature	—	—	—	—
8 „	3196	22·0	0	13	12·5	16·0	—	18·0	Lactating	2nd 3rd	4th 5th 15th	1st	Thoracics and anterior lumbars not ankylosed. Thin cartilage
8 „	3199	21·45	0	19	29·0	35·0	—	15·0	Lactating	3rd 4th 12th 13th	15th	1st	Ankylosed. Join visible in thoracics
10 „	3202	17·95	0	0	—	5·5	—	1·5	Immature	—	—	—	—
11 „	3204	22·5	0	8	—	16·0	—	18·0	Lactating	2nd 3rd 15th	1st 14th 15th	—	Not ankylosed. Thick cartilage
13 „	3210	20·95	0	6	—	12·0	—	20·0	Lactating	2nd 3rd	1st 2nd 14th 15th	—	Not ankylosed. Thick cartilage
13 „	3212	17·95	0	0	—	5·5	—	1·5	Immature	—	—	—	—
14 „	3215	20·3	1	3	89·0	63·0	4·78 Male	8·0	Involuted	3rd 4th 12th 13th	12th 13th	—	Not ankylosed
14 „	3218	16·25	0	0	—	4·5	—	1·5	Immature	—	—	—	—
15 „	3219	22·9	0	21	15·0	14·0	—	28·0	Lactating	2nd 3rd 10th 11th	7th 8th	—	Ankylosed. Join visible in thoracics
18 „	3229	22·3	1	20	83·0	60·0	3·2 Female	6·0	Involuted	5th 6th 12th 13th	13th 14th	—	Ankylosed. Join visible in thoracics
18 „	3230	23·0	0	12	11·0	12·0	—	20·0	Lactating	1st 2nd 13th 14th	14th 15th	—	Not ankylosed. Thick cartilage in thoracics, thin in lumbars
18 „	3231	14·6	0	0	—	4·0	—	1·9	Immature	—	—	—	—
18 „	3232	21·4	0	11	12·0	13·0	—	19·0	Lactating	3rd 4th	3rd 4th 15th	1st	Not ankylosed. Thick cartilage in thoracics and anterior lumbars, thin in posterior lumbars
18 „	3234	20·4	1	1	80·0	50·0	3·2 Male	4·5	Involuted	2nd 3rd 11th 12th	2nd 3rd 15th	1st	Not ankylosed. Thick cartilage
19 „	3235	22·35	1	25	90·0	60·0	2·15 Male	6·0	Involuted	3rd 4th 10th 11th	15th	1st	Ankylosed. Join visible in anterior thoracics
20 „	3237	23·3	0	12	14·0	15·0	—	26·0	Lactating	2nd 3rd	1st 2nd 14th 15th	—	Thoracics and anterior lumbars not ankylosed. Posterior lumbars ankylosed. Join visible
20 „	3238	22·3	0	7	12·0	12·0	—	23·0	Lactating	1st 2nd 12th 13th	15th	1st	Not ankylosed. Thick cartilage

Date	Whale number	Length (m.)	Number of functional corpora lutea	Number of old corpora lutea	Diameter of uterus, pregnant or ex-pregnant cornu (cm.)	Diameter of uterus, immature or non-pregnant cornu (cm.)	Length (m.) and sex of foetus	Thickness of mammary gland (cm.)	State of mammary gland	Vertebrae examined			State of epiphyses
										Thoracic	Lumbar	Caudal	
1930 22 Mar.	3243	20·95	1	7	80·0	67·0	4·97 Male	8·0	Involuted	2nd 3rd 14th 15th	15th	1st	Not ankylosed. Thick cartilage in thoracics, thin in lumbars
25 ,,	3246	17·1	0	0	—	—	—	1·0	Immature	—	—	—	—
25 ,,	3250	21·98	0	21	25·0	26·0	—	26·0	Lactating	4th 5th 11th 12th	15th	1st	Ankylosed. Join visible in thoracics
31 ,,	3251	21·75	1	7	100·0	67·0	3·62 Male	6·0	Involuted	4th 5th 13th 14th	15th	1st	Not ankylosed. Thin cartilage
31 ,,	3253	18·1	0	0	—	5·0	—	2·0	Immature	—	—	—	—
3 Apr.	3263	19·65	0	0	—	6·0	—	3·0	Immature	—	—	—	—

PLATE V

Photographs of sections showing the ankylosis of epiphysis with centrum in female Fin whales. (Centrum on right; epiphysis on left.) (×17 approx.)

Fig. 1.	2nd thoracic	vertebra	of whale	No. 3178.
Fig. 2.	15th	,,	,,	No. 3178.
Fig. 3.	13th lumbar	,,	,,	No. 3178.
Fig. 4.	2nd thoracic	,,	,,	No. 3196.
Fig. 5.	4th lumbar	,,	,,	No. 3196.
Fig. 6.	15th lumbar	,,	,,	No. 3196.

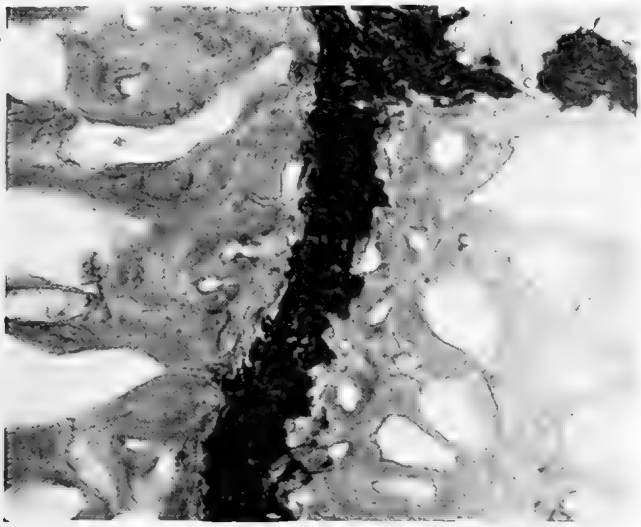

Fig. 1

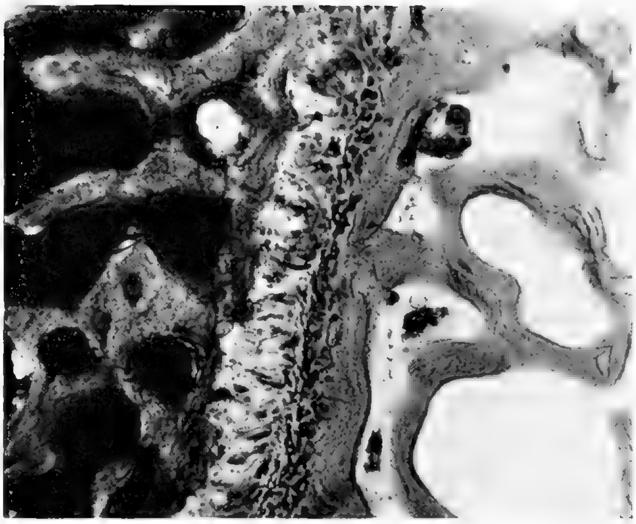

Fig. 4

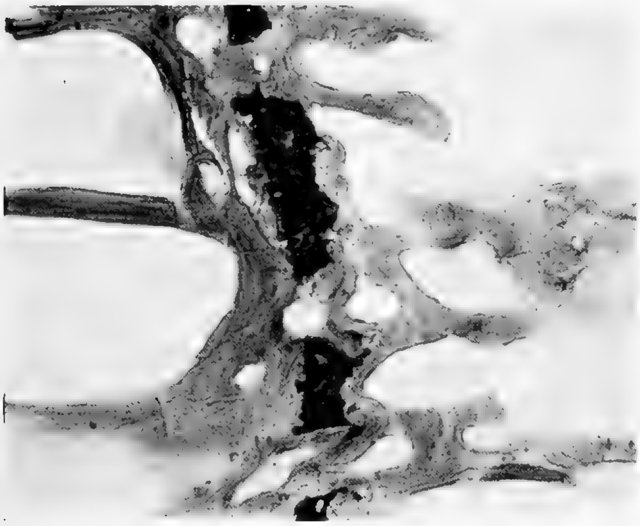

Fig. 2

Fig. 5

Fig. 3

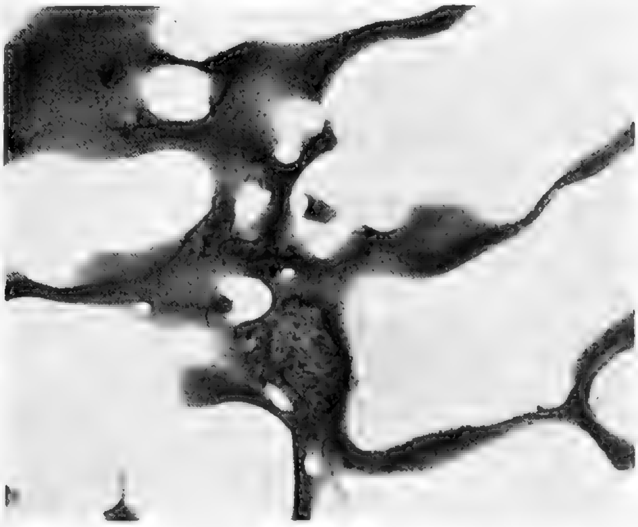

Fig. 6

THE AGE OF FIN WHALES AT PHYSICAL MATURITY

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PRESS

DISCOVERY REPORTS

Vol. II, pp. 435–482, plates VI and VII, text-figs. 1–12

Issued by the Discovery Committee, Colonial Office, London on behalf of the Government of the Dependencies of the Falkland Islands

ON THE ANATOMY OF A MARINE OSTRACOD, *CYPRIDINA* (*DOLORIA*) *LEVIS* SKOGSBERG

by

H. Graham Cannon, Sc.D.

CAMBRIDGE
AT THE UNIVERSITY PRESS
1931

Price seven shillings and sixpence net

Cambridge University Press
Fetter Lane, London

New York
Bombay, Calcutta, Madras
Toronto
Macmillan

Tokyo
Maruzen Company, Ltd

G78.

[*Discovery Reports. Vol. II, pp.* 435–482, *Plates VI and VII, text-figs.* 1–12, *February*, 1931.]

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CONTENTS

ON THE ANATOMY OF A MARINE OSTRACOD, *CYPRIDINA* (*DOLORIA*) *LEVIS* SKOGSBERG

By H. Graham Cannon, Sc.D.
Professor of Zoology in the University of Sheffield

(Plates VI and VII, text-figs. 1–12)

INTRODUCTION

In 1926, I received from Dr Kemp a tube containing about thirty specimens of an Ostracod, most of which were carrying embryos. I identified them as a Cypridinid described by Skogsberg (1920, p. 225) from South Georgia and placed by him in a sub-genus *Doloria* as *Cypridina* (*Doloria*) *levis*. I shall refer to them as *Doloria*.

They had been specially fixed for me in alcoholic Bouin (Dubosq-Brasil). I attempted to section them, and at first failed. The ribbon of sections refused to stick on the slide. In this way all except eight specimens were destroyed. These, as a last resort, I placed in very strong acid alcohol—about 1 part of conc. HCl to 5 of 70 per cent alcohol—for three days. They then sectioned perfectly, and on staining them in Mallory's triple stain I found them to be extraordinarily well fixed. The state of fixation can be seen from Plate VII. I have since treated British marine Ostracods to the same technique but the results have been very poor.

Since the internal anatomy of Cypridinids and, in fact, of Ostracods generally is very incompletely known, I decided to work out the main systems of organs, and the following paper is the result of these investigations.

The systems described are enumerated on the opposite page. I have not described the genital system, as my material was incomplete for this purpose. The labral glands I omitted, as these have already been described many times in detail. The observations are, of necessity, mainly descriptive and will form a basis for comparative work when specimens of Ostracods from other groups are obtained sufficiently well fixed for anatomical work.

I had a further supply of material which, however, had been fixed in alcohol. While sections of these specimens were of no use for studying the details of anatomy, they were useful for skeletal preparations and for confirming observations on my well-fixed material, especially details of musculature.

The exoskeleton and part of the endoskeleton were studied from preparations treated with potash. I used the method which I have previously described (1927, p. 355) in order to obtain sagittal or frontal halves or slices of specimens. These I treated with potash and mounted in glycerine jelly.

In following out the musculature I found the use of polarized light to be of great assistance. (For details see p. 447.)

The figures in Plate VII are of colour photomicrographs taken by the Lumière process. Their colouring is fairly accurate, but not as brilliant as in the original preparations.

FEEDING MECHANISM

The feeding mechanism of *Doloria* may be deduced from a comparison of its body shape and limb arrangement with those of *Pionocypris vidua*, whose feeding habits I have described from direct observation (1926 *a*).

The form of the body is shown in Fig. 2 and Plate VI. It shows a marked difference from *P. vidua*. In the latter, the mouth is brought to the level of the edges of the valves by the large oral mass consisting of the labrum and hypostome (Fig. 1). In *Doloria* the mouth is well inside the valves. The labrum is large but the hypostome is a flat, quadrangular plate, forming the hinder margin of the mouth.

The shell cavity, as in all Ostracods, is divided effectively into two chambers by the attachment of the body to the valves. This runs dorso-anteriorly from the attachments of the adductor muscle (Fig. 2), as a narrow isthmus, and spreads out fore and aft in the region of the heart. The space in the dorsal part of the anterior chamber is almost filled, laterally by the paired eyes, the antennules and the enormous basal joints of the antennae, and medially by the nauplius eye and frontal organ. Below these, the labrum projects downwards in the middle line. Close against its sides, overlapped by the antennae above and projecting forwards in the same relative position as the mandibular palps of *P. vidua*, are the mandibles (Plate VI). The mandibular exopodite forms a small claw on the "knee" and there is no vibratory plate. The maxillules project antero-ventrally at the level of the mouth, their tips working together in the middle line just below the latter. Close behind and parallel with the maxillules are the maxillae with their vibratory plates guarding the entrance from anterior to posterior chamber. The first trunk limbs form two setose triangular plates, parallel and lying close to the median plane between the maxillae. The second trunk limbs, the "bottle brush" limbs, project dorsally into the posterior chamber.

The posterior chamber serves as a brood pouch. In the ripe female it is almost filled by the posterior part of the body. The latter ends in a powerful caudal furca which may project from the shell (Plate VI), or may be flexed up between the first trunk limbs, thus reaching forwards to the level of the mouth.

The similarity between the arrangements of the body in *Doloria* and in *Pionocypris* and the similar structures, not necessarily homologous, which occupy analogous positions in the two chambers of the shell, I consider suggest very strongly that the principle of the feeding mechanism is the same in the two forms.

The vibratory plate of the maxilla, in its oscillation, must paddle water out of the posterior opening of the shell, and, since this plate spans completely the junction of the two chambers (Plate VI), the water must be sucked in at the anterior end of the

shell. Food particles carried on this stream will be abstracted by the grasping action of the mandibles. The latter are bent double at the level of the exopodite so that the tips reach back to the mouth. *Doloria* is probably capable of foraging on the bottom as does the common British Cypridinid *Cylindroleberis oblonga*. In this case, since the mandibles can be projected beyond the edges of the valves, food would be kicked up by their tips in the same manner as function the antennae of *P. vidua*. Such particles would be sucked into the shell cavity by the inhalent stream.

Food is thus gathered or sucked into the shell just underneath the labrum. The immense labral glands open in this region. Their secretion is, of course, the origin of the luminescence of certain Cypridinids. However, it also undoubtedly functions as a food-entangling substance as in the case of *P. vidua*, and enables the mandibles to pass the entangled mass backwards on to the maxillules. The latter are bent double just as are the mandibles but, in this case, the "knee", which occurs between basipodite and coxopodite, points outwards so that the tips of the limbs can be rotated inwards and upwards towards the mouth. These tips are formed by the massive endopodites, and are situated some distance below the actual mouth. In *P. vidua* the maxillules work together in the middle line immediately at the mouth entrance and, with the help of the food rakes arming the back of the mouth, pass the food directly on to the mandibles which are on the same level. In *Doloria*, the food mass has to be lifted up by the tips of the maxillules and deposited on the actual biting parts at the mouth entrance. The latter are formed by the three endites of the maxillule and the endites and part of the exopodite of the maxilla, which work in series with one another. All are armed with complex powerful spines which have been described in great detail by Skogsberg (1920, p. 225). The armature of the first endite of the maxillule is in a line posteriorly with that of the second endite of the maxilla, the second with that of the third and the third with the main tooth of the exopodite of the maxilla.

The food entering the shell is thus entangled in the labral gland secretion, passed backwards by the mandibles on to the endopodite of the maxillule, and lifted up on to the complex biting spines on the more proximal parts of the maxillules and maxillae, where it is triturated.

While this is happening the food mass must be continually subjected to the antero-posterior current passing through the shell. This is counteracted by the first trunk limbs. The setae of the endites of these limbs extend forwards so as to lie actually between the biting setae of the maxillae. The musculature suggests that the limbs move backwards and forwards, thus continually pushing the food mass on to the biting parts. Even if the limbs did not move they would form an effective barrier to food particles.

Similarly the powerful setae on the second exopodite joint of the maxilla project obliquely forwards, and must serve to push any particle which happens to reach them on to the tips of the maxillules and so to the biting parts.

The inward movement of the grinding mouth-parts has a slight upward component which is enhanced by the tendency of the spines to slope upwards, and this results in the food mass, during trituration, passing upwards towards the mouth.

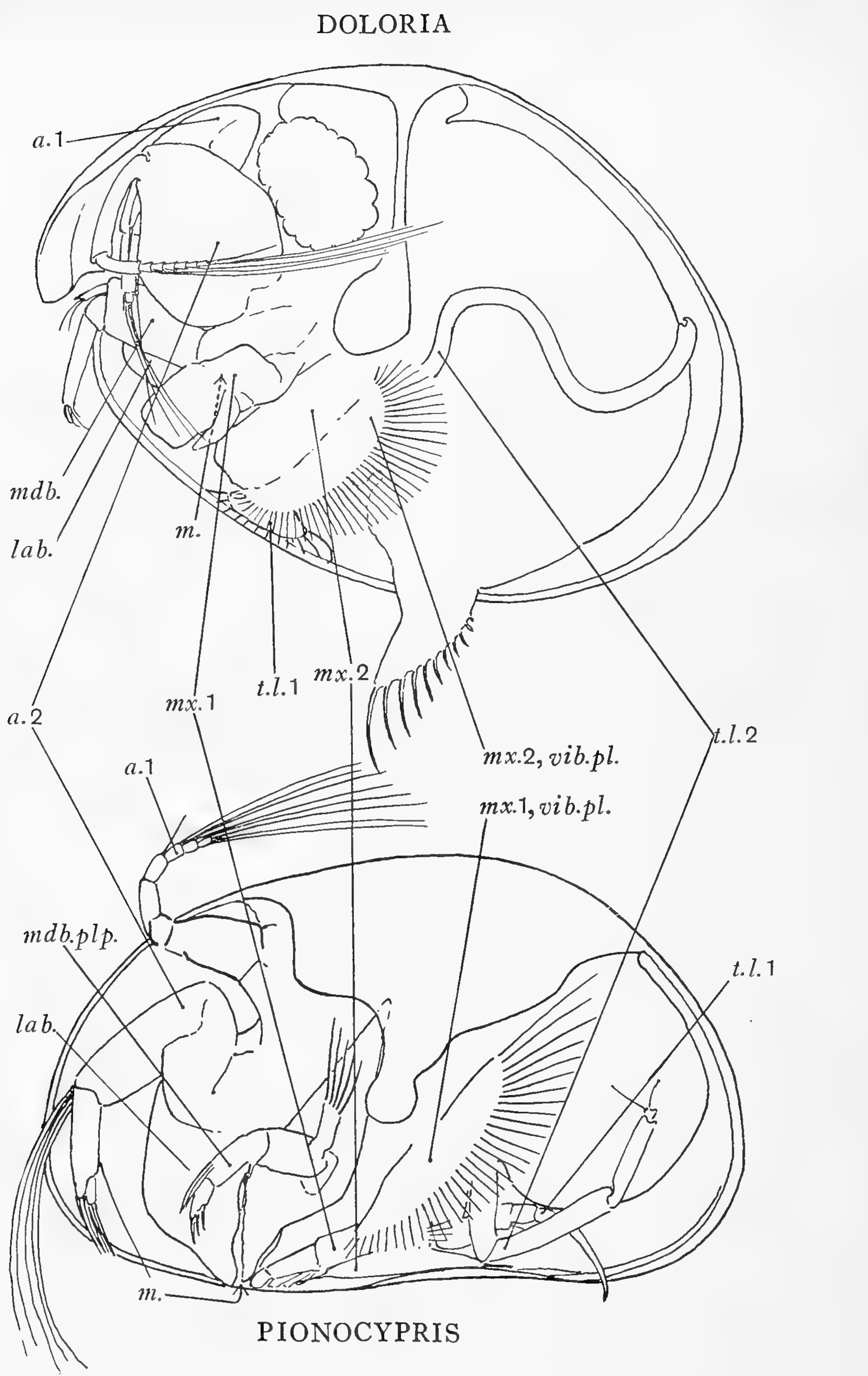

Fig. 1. Side view of *Doloria levis* after removal of left valve. Diagram of the parts shown in Plate VI. An outline drawing of the corresponding figure of *Pionocypris vidua* (Cannon, 1926 *a*, Plate 11) is given below for comparison. *a.* 1, antennule; *a.* 2, antenna; *lab.* labrum; *m.* mouth; *mdb.* mandible; *mdb.plp.* mandibular palp; *mx.* 1, maxillule; *mx.* 2, maxilla; *mx.* 1, *vib.pl.* vibratory plate of maxillule; *mx.* 2, *vib.pl.* vibratory plate of maxilla; *t.l.* 1, first trunk limb; *t.l.* 2, second trunk limb.

The first endite of the maxilla together with the more dorsal spines of the first endite of the maxillule and the gnathobasic process of the mandible point directly upwards into the mouth.

A summary of the above comparison between the feeding mechanisms of *P. vidua* and *D. levis* is shown in the following table (see Fig. 1):

	P. vidua	*D. levis*
Food stream through shell produced by	Vibratory plate of maxillule	Vibratory plate of maxilla
Food collected by	Mandibular palps	Mandibles
Food entangled by	Labral gland secretion	Labral gland secretion
Food mass passed by mandible on to	Maxillule	Endopodite of maxillule
Food mass passed from maxillule on to biting mouth-parts which are	Gnathobasic coxopodites of mandibles	Three endites of maxillules, two endites of maxilla and part of exopodite of maxilla
Food prevented from escaping and pushed back on to mouth-parts by	First trunk limbs	First trunk limbs
During bottom feeding food may be scraped up by	Antennae	Mandibles

SKELETON AND BODY WALL

The body wall of *Doloria*, apart from the valves and limbs, is, as in all Ostracods, excessively thin. The appendicular system attains its stability through two separate skeletal organizations—a series of narrow articulating sclerites which radiate from the attachment of the adductor muscle to the valves, and a rigid system comprising the upper lip and powerful endoskeletal structures connecting the latter to the adductor muscle. The adductor muscle is thus the centre of stability for the whole body.

In considering the mechanics of the body, it may be divided into two portions—a soft flexible dome covering the back between heart and caudal furca (Plate VI), and the ventral half to which the limbs and furca are attached (Fig. 2). The latter can again be divided into two parts—the anterior which supports the eyes and limbs, and the posterior caudal furca.

ENDOSKELETON AND SCLERITES

The anterior limb-bearing portion centres round the massive upper lip. The labrum is helmet-shaped, and is encircled completely about its equator by a slightly thickened chitinous ring. Postero-laterally this thickening becomes more massive and extends around the sides and back of the mouth. It thus forms the anterior margin of the hypostome, which consists of an oblong plate with the longer axis lying transversely. From its anterior corners there project inwards a pair of massive tubular endoskeletal structures which extend dorsally and, at their upper ends, turn sharply at right angles towards the middle line but do not meet (Figs. 2, 3). Their upper portions are embedded in the tendon of the adductor muscle (Figs. 4, 5) which forms the hinder portion of a complicated endosternite. They have been termed by Müller (1894, p. 19) and others the "Sternaläste 1". I am naming them the "anterior hypostomal apodemes".

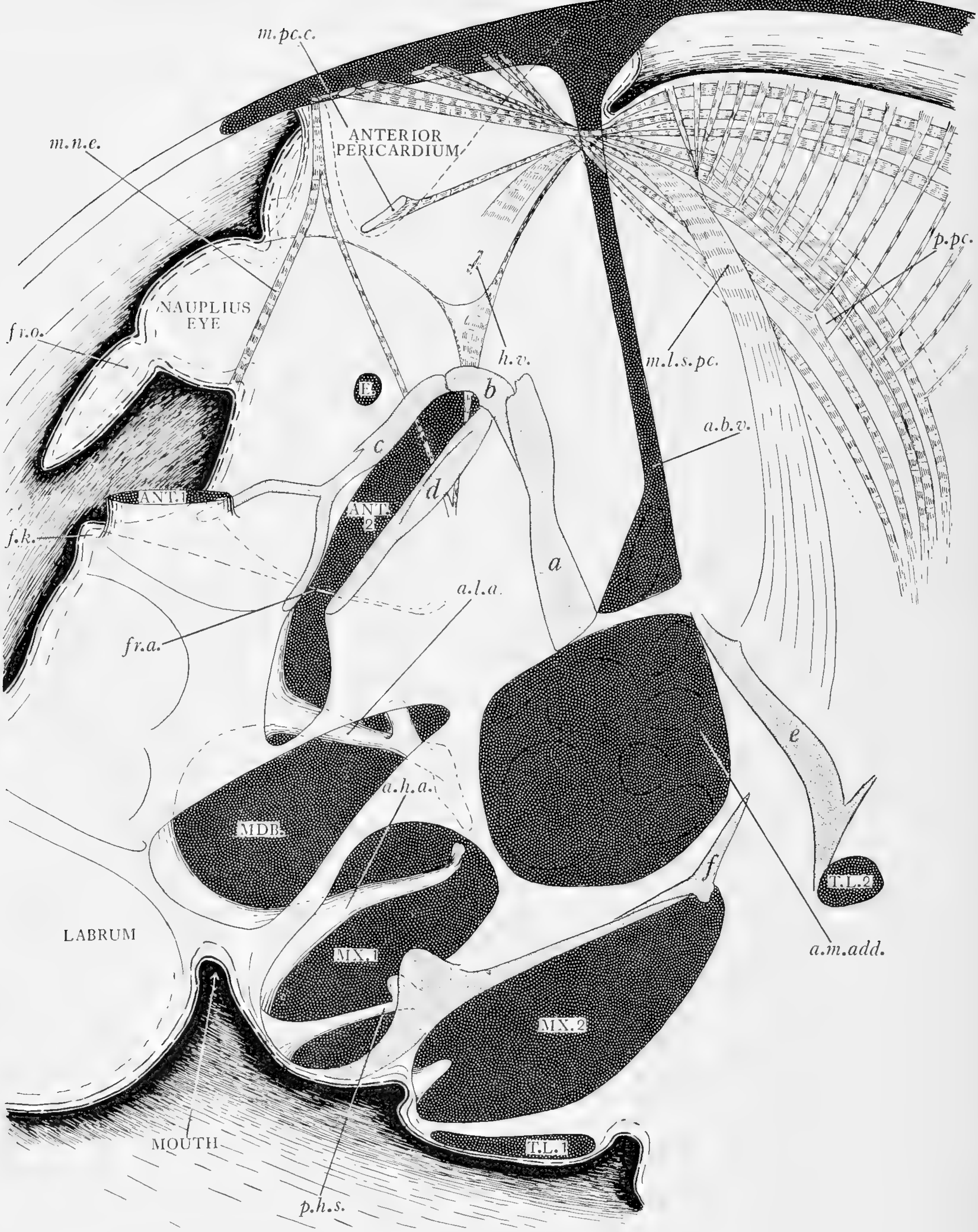

Fig. 2. Side view of *Doloria levis*, the left valve, the limbs and the left eye having been removed. The attachment of the limbs to the body and the body to the shell are indicated approximately. They are shaded by a dark, and the sclerite system by a light stippling. The musculature associated with the pericardium and dorsal body wall is also figured. *a.b.v.* attachment of body to valves; *a.h.a.* anterior hypostomal apodeme; *a.l.a.* antenno-labral apodeme; *a.m.add.* attachment of adductor muscle; *f.k.* frontal knob; *fr.a.* frontal apodeme; *fr.o.* frontal organ; *h.v.* hepatic valve; *m.l.s.pc.* lateral sub-pericardial muscle; *m.n.e.* nauplius eye muscle; *m.pc.c.* pericardial compressor; *p.h.s.* posterior hypostomal strut; *p.pc.* posterior pericardium.

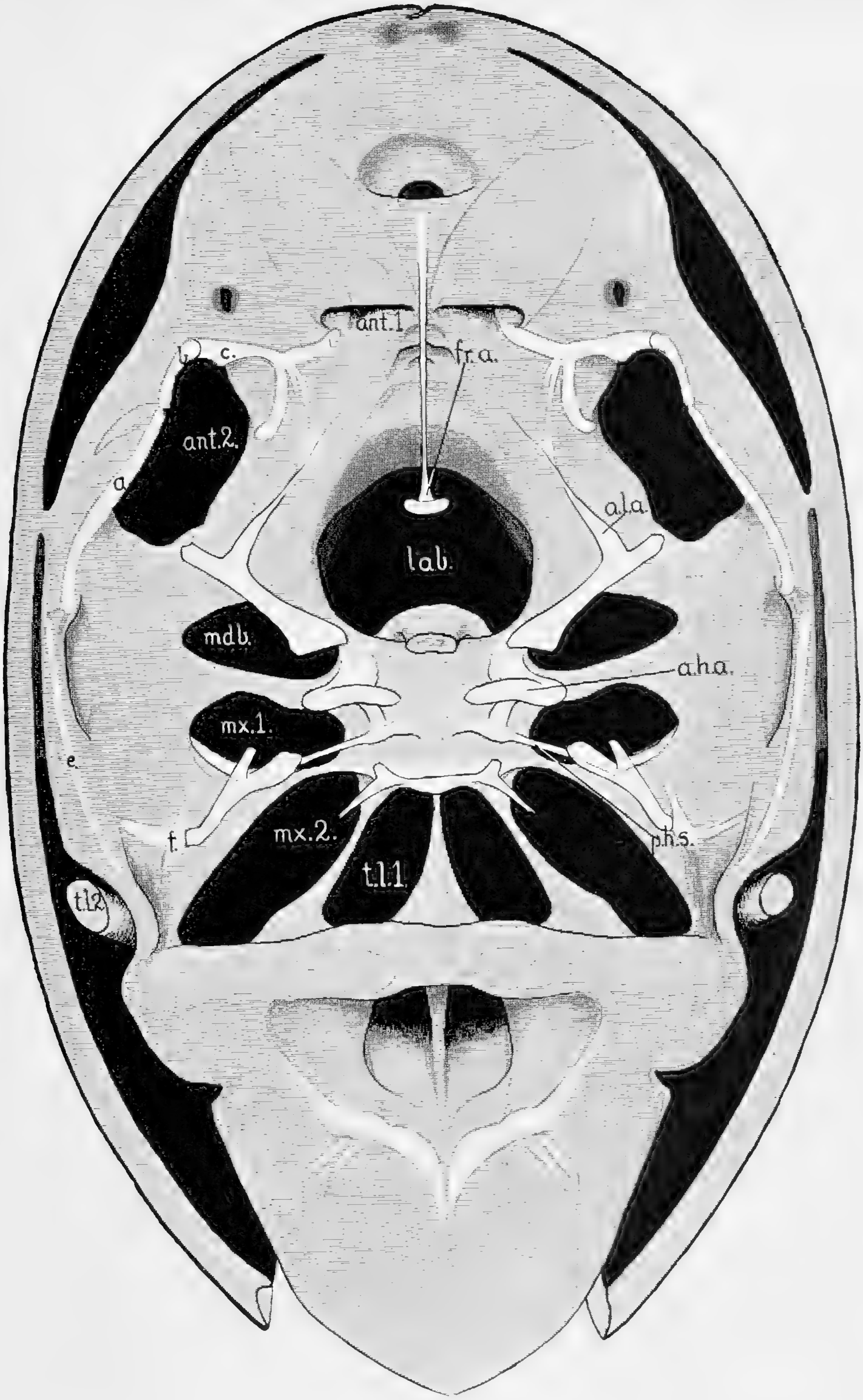

Fig. 3. Semi-diagrammatic view of the ventral skin of *Doloria levis*, seen from the inside, and showing the attachments of the limbs (black) and the endoskeletal structures (white). *a.h.a.* anterior hypostomal apodeme; *a.l.a.* antenno-labral apodeme; *ant.*1. antennule; *ant.* 2, antenna; *fr.a.* frontal apodeme; *lab.* labrum; *mdb.* mandible; *mx.* 1, maxillule; *mx.* 2, maxilla; *p.h.s.* posterior hypostomal strut; *t.l.* 1, first trunk limb; *t.l.* 2, second trunk limb. (× 134 approx.)

Around the upper limit of the labrum, at the level of the small rigid knob, the "frontal knob" (Figs. 2, 4), between the attachment of the antennules, there is another less-marked chitinous loop which extends backwards to the inner point of attachment of the antennae, and is then produced into the body on either side as a powerful endo-skeletal tube. These slope back for a short distance, and each then divides into a small, outer branch and a larger, flat, inner branch (Figs. 2, 3, 5), which lies more or less in a frontal plane and slopes backwards to become embedded in the endosternite just anterior to the anterior hypostomal apodeme. They have been termed the "Oberlippenäste" (Müller, 1894, p. 19). Since they are inward extensions of the fold of cuticle which forms the junction of the median face of the antennae with the labrum, I am calling them the "antenno-labral apodemes".

The upper labral loop and the equatorial loop are joined by a thickening down the sides of the labrum, completing a triangle with the endoskeletal apodemes. The whole of the labrum is thus supported by a rigid scaffolding from the adductor muscle.

A third paired endoskeletal structure exists, which Müller has termed the "Sternaläste 2" (1894, p. 19). It is not, however, of the same nature as his "Sternaläste 1" which are true apodemes. It consists of a chitinous strut, which spans the body cavity from the posterior corner of the hypostome to the posterior attachment of the maxillule to the body (Fig. 2). It has presumably been formed by the nipping off of the edge of an infolding between maxillule and maxilla in a manner comparable to the formation of the intersegmental bars, which become transverse tendons in *Hemimysis* (Manton, 1928, p. 414). It should thus be distinguished from an apodeme, the development of which (Manton, 1928, p. 412) suggests that they arise by the gradual sinking into the body of the surface of attachment of a muscle or group of muscles. Hence I have called it the "posterior hypostomal strut". At its upper end it sends forward a small prolongation which is a true apodeme, serving for the attachment of a muscle which runs to the anterior hypostomal apodeme, and then continues up the side of the body as a cuticular thickening.

In addition to these paired skeletal structures, there is an excessively thin median apodeme—the frontal apodeme—arising from the ectoderm just above the frontal knob (Figs. 2, 3, 4). It is so delicate that it cannot be seen in preparations of the ventral skeleton. In sagittal sections, however, it can be seen as a triangular fold of cuticle in the median plane which narrows down to a thin hollow strand and passes through a small aperture in the hinder margin of the brain. It then curves upwards and forwards, and spreads out as a triangular plate, to which is attached a thin tendinous sheet, the aortic tendon (Figs. 4, 5).

The frontal apodeme is a very important structure in relation to the blood system, and will be referred to later. The paired elements, together with the armoured upper lip, function mainly as limb supports. They support certain limbs directly. Thus the mandible, at the lowest point of its attachment, is joined firmly to the equatorial thickening around the labrum just in front of the mouth. The rest of the attachment is thin, the limb merging into the lateral body wall. The articulation of the maxillule

is bounded ventrally by the thick lateral edge of the hypostome, and posteriorly by the cuticular thickening which runs up between the maxillule and maxilla to the upper end of the posterior hypostomal strut.

The mandibles and maxillules are thus firmly connected to the adductor muscle by the endoskeletal apodemes and labrum. The remaining limbs, with the possible exception of the first trunk limbs, are connected with the adductor system through a series of articulating sclerites which, until a more detailed and comparative account of the skeleton can be given, I am denoting by letters.

A thin sclerite labelled *a* (Fig. 2) runs antero-dorsally from the upper margin of the attachment of the adductor muscle. It articulates with a shorter sclerite *b*, which, in its turn, articulates with sclerite *c* which is shaped like an inverted Y. This runs down towards the labrum. The anterior branch of the Y reaches a point just above and at the side of the frontal knob. It articulates directly with a thin sclerite running along the median face of the first joint of the antennule. The posterior branch similarly supports the inner attachment of the antenna to the body. It stretches down to the commencement of the antenno-labral apodeme. At the junction of the *a* and *b* sclerites a fourth sclerite *d* slopes downwards and supports the outer attachment of the antenna to the body.

The lateral eyes are attached to the body by short eye stalks close against the front of the upper ends of the *c* sclerites. Their movement is effected through muscles which attach to these anterior sclerites.

From the posterior side of the attachment of the adductor muscle to the body, a thin sclerite *e* runs downwards and supports the attachment of the second trunk limb. Dorsally it is connected with the base of the *a* sclerite by a powerful apodeme which runs anteriorly just below the dorsal constituent of the adductor muscle.

Postero-ventrally to the adductor attachment a thin sclerite *f*, pointed at both ends with a posterior knob projecting about the middle of its length, runs down to the end of the thickening which has already been described as the continuation up the side of the body of the posterior hypostomal strut. On the posterior knob a small rod-like sclerite articulates, and supports the upper part of the vibratory plate of the maxilla.

The first trunk limbs are attached to the body, very close together in the middle line. The body wall, both in front of them and behind, is folded inwards so as to form a transverse ridge (Figs. 2, 3), but there does not appear to be any special sclerite supporting the attachment.

ENDOSTERNITE

The true endoskeletal elements exhibit a characteristic staining reaction in Mallory. On the whole they stain a fairly deep Cambridge blue, but always a part stains bright orange (Plate VII), which is the colour taken up by the exoskeletal sclerites. The endosternite, on the other hand, stains a bright royal blue, and can be clearly distinguished from the endoskeletal elements. It is of a different composition from the latter, as it disappears completely after treatment with potash.

The main mass of the endosternite (Fig. 5), consisting of a transverse plate in which are embedded the upper ends of the anterior hypostomal apodemes, curves upwards at the sides and merges into the two halves of the adductor muscle. As a result of this dorsal concavity of the adductor system, contraction of the muscle must lift the body into the shell as the valves close.

Laterally, the endosternite is prolonged forwards on either side of the oesophagus (Fig. 5) as a thin, elongated triangular plate, the apex of which serves for the attachment of the posterior eye muscles. The latter run forwards and attach to the sclerites *c* immediately behind the eye stalks.

The two anterior prolongations I have called the endosternite fork. The flat inner ends of the antenno-labral apodemes are embedded in the proximal parts of the prongs of the fork.

Spanning the gap between the tips of the fork is the aortic tendon (Fig. 5). This is an extremely thin tendinous sheet, in the median posterior part of which is embedded the inner end of the frontal apodeme.

From the level of the anterior hypostomal apodemes there occurs, on either side, a thin strut connecting the adductor muscle tendon with the upper part of the stalk of the antenno-labral apodeme (Fig. 5).

Posteriorly there arise two very thin tendinous strands, which slope rapidly towards the middle line and terminate in a pair of median plates (Fig. 5), one above the other, which serve for the attachment of muscles running to the vibratory plate of the maxilla. The lower plate also serves muscles from the maxillule.

DORSAL BODY WALL

I have already described the dorsal body wall between the heart and caudal furca as a soft flexible dome. It consists of a chequer-work of muscles, formed of dorsal longitudinal muscles and a series of transverse muscles—or, more accurately, circular muscles—lying close inside the ectoderm and connected through it direct to the cuticle. The latter are figured but not described by Müller (1894, Pl. 35, fig. 5).

The dorsal longitudinal muscles consist on either side of about eight thin strands—the number varies—running side by side from the caudal furca to the sides of the heart. The arrangement and anterior attachments will be described later in connection with the blood system. Throughout their length they are attached at intervals by short thin tendinous strands, certainly to the ectoderm and probably through the latter to the cuticle.

From the mid-dorsal line numerous circular muscle bands extend round the sides of the body (Figs. 2, 4). In extending ventrally they converge and fuse with the ectoderm, just below the most lateral of the dorsal longitudinal muscles. The ventral attachment of the more anterior bands merge into an extremely thin tendinous sheet connected with the *e* sclerite. The muscles lie just inside the ectoderm and are attached closely to it by tendinous strands at very short intervals.

The constitution of this body wall shows up very clearly when examined by polarized light. I made a microtome preparation of the right half of *Doloria* and, after removing the wax, and transferring the specimen to glycerine, picked out the gut and gonads with fine needles and washed out the body cavity. Such a specimen, when examined between crossed Nicols, shows either the dorsal longitudinal muscles brilliantly illuminated and the circular muscles as dark streaks across them, or the reverse, depending on the relation between the direction of their myofibrils and the axes of the Nicols. A more satisfactory method of study is to place a thin selenite layer underneath the lower Nicol. In this case one set of muscles will appear brightly coloured and the other set also bright, but in a different colour. By rotating the stage the colours can be reversed. In this way the circular muscles can be followed very accurately to their point of fusion with the ectoderm. They do not appear to be so markedly doubly refractive as the dorsal longitudinal muscles.

The extremely close association of the circular muscles with the cuticle, and the fact that it is difficult to decide exactly where the muscle emerges from the ectoderm, suggests that these muscles are of ectodermal origin. Further in support of this, is their staining reaction and histological detail. The dorsal longitudinal muscles stain on the whole a deep purplish red, and show all the detail of typical striped muscle. The circular muscles, on the other hand, stain a brighter red and exhibit merely an alternation of staining and non-staining zones which merge into each other. Krause's membrane is entirely absent. Now these are just the characteristics of the early stages of those dorso-ventral muscles of *Chirocephalus* which I was able to show (1926 *b*, p. 406) were derived from the ectoderm. They also exhibited this "moniliform" staining and did not show Krause's membrane during their early stages.

Further, I showed that in still earlier stages of these muscles the myofibrils were continuous and stained uniformly throughout their length. Just behind and above the attachment of the adductor muscle of *Doloria*, sections tangential to the surface show bands of such continuous myofibrils running in various directions, and these appear to lie in the ectoderm cells. I consider that these are ectodermal muscle cells which are even less "mature" than the circular muscles.

The chief interest in the dorsal body wall of *Doloria* lies in the fact that, in its constitution, it is Annelidan. In the Annelid the body wall consists of a thin cuticle, the ectoderm, the circular muscles and the longitudinal muscles occurring in this order from outside inwards, and the circular muscles of *Criodrilus* are ectodermal according to Staff (1910). In *Doloria* there is the same arrangement. I do not mean to imply that the circular muscles of *Doloria* are homologous with those of Annelids. From my work on *Chirocephalus* I believe, although I did not stress this point in the paper, that the Annelid circular muscles became transverse and dorso-ventral muscles when the cuticle hardened and took over the function of supporting the musculature, and the Annelid became thus transformed into an Arthropod. The ancestral Crustacean probably had this muscle constitution. But in *Doloria* the whole body has become enclosed in a protective shell. All the limbs, the mouth-parts and the eyes are supported by the

efficient system of endoskeletal elements and articulating sclerites to the powerful adductor muscle and this, in turn, reciprocally supports the bivalve shell. The dorsal body wall is thus, to a large extent, emancipated from any supporting function and consequently it has lost its rigidity and become a soft flexible dome.

In all the Crustacea the function of the dorsal longitudinal muscles is to extend the caudal region. In *Doloria*, and probably in Ostracods generally, since they all have a flexible body wall, the softening of the cuticle in this region would have placed these muscles at a disadvantage and so, as a compensation, they have become attached along their length to the cuticle. On contraction they can still extend the caudal region but, at the same time, they must press in the body wall and so have a great effect on the movement of body fluids. This new function of moving the body fluids or of regulating the body fluid pressure, I believe, must be the main function of the dorsal body wall, and to enhance it the circular muscles have developed.

That they have developed from the ectoderm is not strange. The Crustacean ectoderm is, in my opinion, a supporting tissue of varied potentialities. It may produce a hard external plate or sclerite. It may pass inwards and produce an endoskeletal apodeme (Manton, 1928, p. 414), or a tendon joining transverse muscles (Manton, 1928, p. 412). Or again, it may give rise to a muscular sphincter, a group of cells exhibiting continuous myofibrils but not striation, such as I described in Cyprids (1925, p. 15). It may finally give rise to typical striated muscle which "cannot be distinguished from the mesodermal muscles" (Cannon, 1926 *b*, p. 413). All these are cases where the actual development of the ectoderm has been followed embryologically. The circular muscles of *Doloria* I consider come between the last two cases quoted.

BLOOD SYSTEM

Very little is known concerning the circulatory system of Ostracods beyond the fact that a globular heart with a single pair of ostia occurs in Cypridinids and Halocyprids. Claus (1891) described the histology and general anatomy of the Halocyprid heart, and from his figures it is obvious that he was dealing with moderately well-fixed material. Both Müller (1927, p. 415) and Klie (1929, p. 37) state, in addition, that a short vessel arises anteriorly which runs to the brain and that, in many Cypridinids, a pair of lateral vessels run towards the attachment of the adductor muscles (see later, p. 453). The lengthiest description of an Ostracod blood system is that of *Gigantocypris* by Lüders (1909). It is, however, badly illustrated and undoubtedly inaccurate (see later, p. 449).

HEART AND PERICARDIUM

The heart lies in a well-defined pericardial space close under the middle region of the hinge of the shell just above the level of the eye stalks (Figs. 4, 5). The general anatomy and histology of the Halocyprid heart described by Claus (1891, p. 41) will apply equally to *Doloria*.

The whole heart is covered, except for its apertures, by a layer of parenchymatous

cells which, in places, are drawn out into strands connected to the pericardial walls. This tissue is mentioned by Lüders (1909, p. 114), and he probably referred to the suspensory cells when he stated: "Auch trifft man vereinzelte Kerne mit faserigen Auslaüfern an, die mit Ganglienzellen grosse Ähnlichkeit haben, besonders mit denen, die man in den Schalennerven antrifft". But since, in his detailed description of the nervous system, he does not mention a shell nerve, and, so far as I am aware, no such nerve has ever been described in the Crustacea, it is difficult to see what he was actually referring to.

The heart has five apertures, a pair of ostia postero-dorsally, an opening into a median aorta antero-ventrally—the aortic valve, and a pair of openings through the pericardial floor into a parenchymatous tissue surrounding the gut (see later, p. 464), which I call the hepatic valves (Figs. 5, 11). I use this term merely for convenience, and do not imply any special function of this parenchymatous tissue.

All these apertures are effectively splits in the heart wall, but the constitution of the ostia differs from that of the others. Each ostium, as Claus described, consists of a pair of parallel muscles which run close together from the median plane obliquely backwards. Their apposed edges project inwards into the heart cavity as in typical Arthropod ostia and so, on contraction of the heart, they act as valves in preventing the escape of blood.

The remaining apertures consist of gaps in the muscular wall of the heart, the edges of the gaps being fused with the pericardial floor. The actual openings thus consist of splits in the latter, and the splits are bounded by a development of myofibrils. This can be seen very clearly in one of my preparations, where the heart wall around the hepatic valve has been drawn out into a cylindrical tube which terminates round the split. These apertures must function quite differently from the ostia. The latter act as true valves, only allowing the passage of blood into the heart, whereas the former are not real valves but rather taps. By the contraction and relaxation of their muscles the apertures can be closed and opened, but the passage of blood through them is equally possible in either direction. However, I am calling them valves for want of a better word and because, in all probability, blood passes through them only in one direction.

Wrzesniowski (1879, p. 539) described the hearts of various Amphipods, and states that these terminate anteriorly and posteriorly in a complicated valve consisting of a thin diaphragm containing a median split, and Wilson (1903, p. 689) mentions similar openings occurring with true ostia in the heart of certain species of *Branchiura*.

The connection between the heart and the gut parenchyma was described by Lüders in *Gigantocypris* (1909, p. 115). However, it was undoubtedly these connections that Claus discovered as early as 1891 in a heart dissected out of a *Conchoecissa* (p. 41). He mentions the fact that they are not true ostia but simply "freien Streifen zwischen benachbarten Gruppen von Muskelzügen" (p. 42).

Lüders describes the hepatic apertures as afferent structures and states that each is provided with a valve allowing the passage of blood into the heart (p. 116). He did

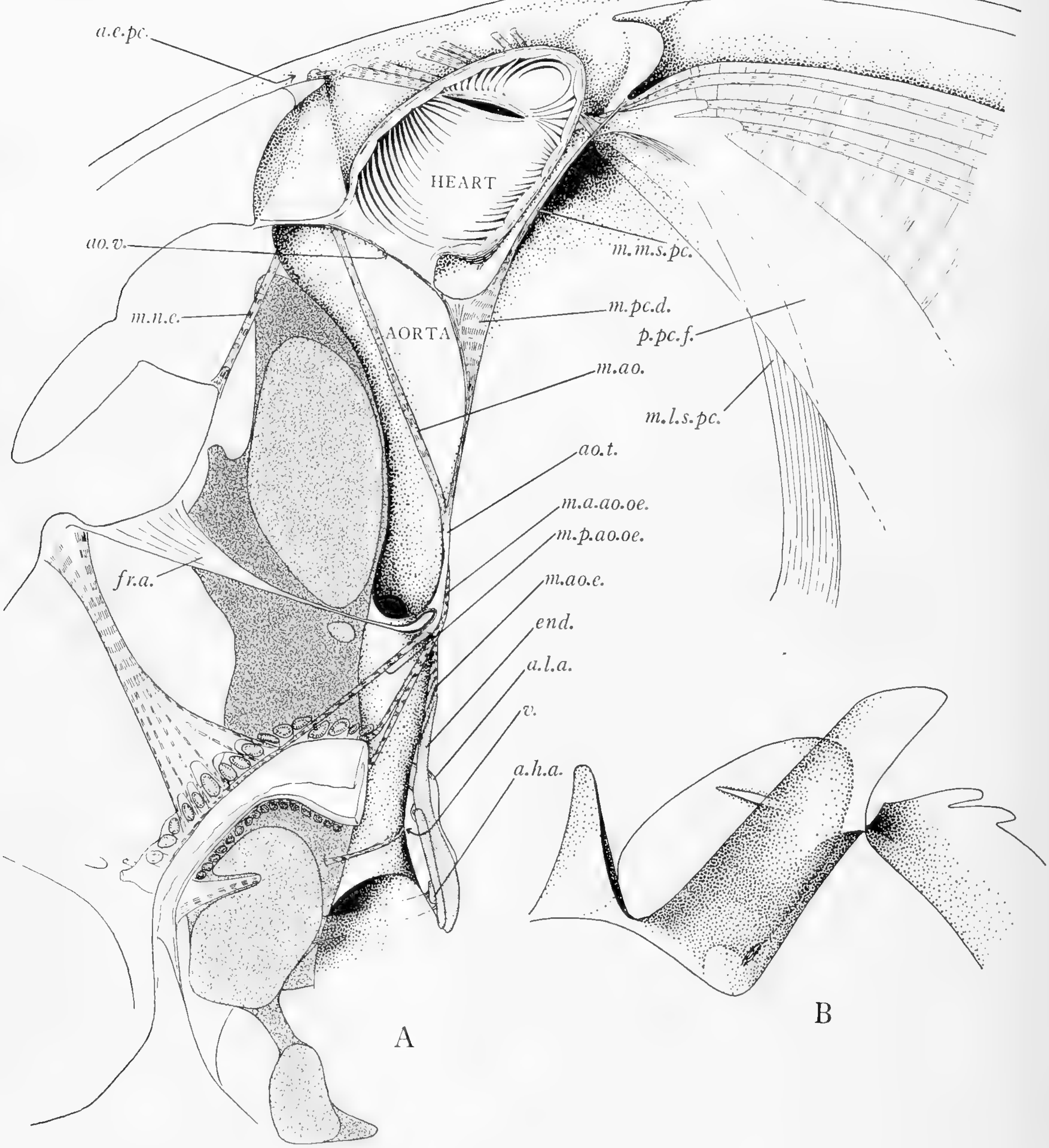

Fig. 4. A. Right half of the fore-part of *Doloria levis*, viewed from the sagittal plane, to show the blood system and associated muscles. B. Left half of pericardial floor and heart, which have been removed to obtain the view shown in Fig. 3 A. *a.e.pc.* anterior entrance to pericardium; *a.h.a.* anterior hypostomal apodeme; *a.l.a.* antenno-labral apodeme; *ao.t.* aortic tendon; *ao.v.* aortic valve; *end.* endosternite; *fr.a.* frontal apodeme; *m.a.ao.oe.* anterior aortic-oesophageal muscle; *m.ao.* aortic muscle; *m.ao.e.* aortic-endosternite muscle; *m.l.s.pc.* lateral sub-pericardial muscle; *m.m.s.pc.* median sub-pericardial muscle; *m.n.e.* nauplius eye muscle; *m.p.ao.oe.* posterior aortic-oesophageal muscle; *m.pc.d.* pericardial dilator; *p.pc.f.* floor of posterior pericardium; *v.* valve in supraneural vessel. (× 200 approx.)

not, however, give any figures, and this is undoubtedly incorrect. He missed completely the pericardial floor and, without this, the functioning of the heart cannot be clearly understood.

The pericardium consists strictly of two parts, the anterior pericardium in which lies the heart (Fig. 4 A) and the posterior pericardial space which extends into the trunk (Fig. 2).

The anterior pericardium is roofed and walled laterally by the carapace. The front wall is formed by the body wall above the nauplius eye, and the hind wall by a soft flexible portion of the body wall which bulges in between the trunk ventrally and the carapace dorsally. The pericardial floor can be considered as a membrane slung from a median point just above the nauplius eye and the median point which marks the anterior limit of the soft flexible dome of body wall covering the trunk. Laterally it is attached partly to the body wall and partly directly to the valves of the carapace. Its line of attachment has been twisted into a distorted M by certain muscles, whose insertions lie in bays formed by its lateral margins. This is illustrated in Figs. 4 A, B. The former represents the right half of a specimen of *Doloria* and the latter is a drawing of the left half of the pericardial floor and heart which has been removed to obtain Fig. 4 A. These figures are based on various series of sections. It is quite impossible to see the actual floor in dissection as its extreme thinness renders it invisible.

The first bay is occupied by the common dorsal attachment of three separate muscles. The first of these is a muscle which runs from the median ectoderm just below the nauplius eye and extends up on either side to attach to the carapace valves just lateral to the hinge and immediately in front of the most anterior of the dorsal longitudinal muscles which attach directly to the carapace. I have called it the nauplius eye muscle (Figs. 2, 4 A, 6). The second is the aortic muscle which I shall describe later and the third, a muscle which I have not figured, running to the paired eye, the anterior eye muscle.

The pericardial floor, after curving upwards to accommodate this attachment, recurves sharply downwards to pass underneath the attachment of a muscle running in the pericardium itself. This runs from a point just above the eye stalk to a point slightly lateral to the mid-ventral region of the hinder wall of the anterior pericardium (Figs. 2, 6). Here it is joined to its fellow by a tendinous strand, and continues after a tendinous junction as the most median of the dorsal longitudinal muscles. This muscle I have called the pericardial compressor.

The attachment of the pericardial floor now passes postero-dorsally to curve round the posterior attachment of a big muscle (not figured), the postero-dorsal eye muscle. Passing forwards along the posterior face of this muscle it turns sharply backwards and enters the trunk region as the lateral margin of the posterior pericardium.

In order to explain the posterior pericardium I must describe in more detail the dorsal longitudinal muscles. Passing from the hinder wall of the anterior pericardium and extending posteriorly to the caudal furca are three band-like muscles which may bifurcate and again join up before reaching their hinder limit (Fig. 2). The first of these,

that is, the most median, I have already mentioned as being a continuation, through a tendinous junction, of the pericardial compressor. The second runs forward to attach directly to the carapace immediately behind the upper attachment of the nauplius eye muscle. The third attaches close behind the second.

Lateral to these three muscles is a group of five more, the fourth to the eighth. These also attach anteriorly to the carapace valves, and in a line with the attachment of the more median muscles. The more lateral muscles attach more posteriorly, that is, the fourth attaches just behind the third, and the eighth has the most posterior attachment. As they pass out of the anterior pericardium they lie close over the pericardial floor and, in side view, appear to cross each other. They extend a short distance behind this level and attach directly to the ectoderm (Fig. 2). From here they run parallel, and are attached at intervals to the ectoderm and to the circular muscles. They curve ventrally and end in a tendinous plate immediately inside the ectoderm, which extends forwards to the lower limit of the *e* sclerite.

The lateral attachment of the anterior pericardial floor, on entering the trunk region, passes posteriorly just outside the eighth dorsal longitudinal muscle. The floor of the posterior pericardium does not extend right across the body, but has a medial line of attachment. This extends from the median ventral point of the hind wall of the anterior pericardium, across the first dorsal longitudinal muscle and, after sending a small bay down the second and third muscles, extends down the medial side of the fourth (Figs. 4 A, 5). The posterior pericardial floor thus lies close underneath the lateral group of dorsal longitudinal muscles. It can be traced almost to their posterior limits where it disappears.

The middle line of the anterior pericardial floor is pulled down into the form of a V by a powerful muscle, the pericardial dilator (Figs. 4 A, 6). The anterior arm of the V is split along the middle portion of its length. The sides of the split have developed continuous myofibrils and are fused with the walls of the heart. The split forms the aortic valve by which the heart communicates with the aorta. The posterior arm of the V consists of a well-marked band of continuous myofibrils—the median sub-pericardial muscle.

The apex of the V is rounded, and along the curved part is attached the pericardial dilator. In side view (Figs. 2, 4 A) this appears as a fan-shaped muscle spreading out to its dorsal attachment. It is, however, continuous posteriorly with the median sub-pericardial muscle and anteriorly with the muscles in the lips of the aortic valve. In passing ventrally, it spreads out laterally and attaches along a transverse line to the aortic tendon. Actually, the shape of the muscle is that of a tetrahedron with curved edges (Fig. 6).

Passing upwards from the *e* sclerite, that is, just behind the attachment of the adductor muscle, there is a thin tendinous sheet, which narrows down and becomes muscular as it extends dorsally. It lies at first immediately inside the ectoderm and, while still in this position, enters the posterior pericardium (Fig. 4). Here it runs obliquely forwards across the eighth, seventh and sixth dorsal longitudinal muscles,

and then passes in between the sixth and fifth (Fig. 2) and merges into the pericardial floor in the region where this passes over from posterior to anterior pericardium (Figs. 5, 6). It now curves downwards and disappears towards the region of the hepatic valves. Where it lies in the pericardial floor it is excessively thin, and can only be seen in sections when it happens to lie in the plane of the section. I have called it the lateral sub-pericardial muscle. I was able to follow it clearly in polarized light in the type of preparation I have already described for the study of the dorsal body wall.

The functioning of the various muscles of the pericardium is described later (p. 456) after a description of the blood vessels.

BLOOD VESSELS

An aorta extends backwards from the heart lying in a groove between the two halves of the brain. Anteriorly it ends blindly in the parenchyma which occurs around the antero-medial attachment of the pericardial floor, this latter attachment marking the level of the floor of the aorta. Posteriorly it extends as far as the aortic tendon which forms its roof in this region. The lower face of the pericardial dilator and the median strip of the pericardial floor from this muscle, as far as the posterior limit of the aortic valve, run in the middle line of the roof of the aorta. The aortic valve thus cuts obliquely through the aorta (Fig. 4 A), its posterior end being in the roof and the anterior end in the floor. The walls of the aorta are supported by a pair of muscles, the aortic muscles (Figs. 4 A, 5, 6), which run forward from the aortic tendon and join the nauplius eye muscles just below their upper attachment. Posteriorly they are flattened and form part of the aortic roof, but in sections through the more anterior part they can be seen lying on the inner face of the aortic walls.

The walls of the aorta are thin but very definite and, as in all the arteries, it is impossible to distinguish any cell limits or nuclei. The aorta is supported anteriorly by the parenchyma already mentioned. This extends backwards along its sides and joins the gut parenchyma which runs up to the hepatic valves (Fig. 11). Apart from this the aortic walls are naked.

Lüders (1909, p. 117) refers to a vessel in *Gigantocypris* which must be the aorta, but he describes it as a more or less indefinite split between connective tissue cells.

At the level of the aortic tendon the aorta divides into two (Fig. 5). Each half at once divides again sending one branch laterally to the antennae, and the other branch posteriorly underneath the prongs of the endosternite fork and above, and attached to, the lateral portions of the nerve ring. This bifurcation is probably what is referred to by Müller (1927, p. 415), when he states that the aorta sends two branches to the neighbourhood of the attachment of the adductor muscle, and by Klie (1929, p. 37), who describes "2 seitliche, nach der Schalenmitte gerichtete Bahnen".

The posterior branches each give off a vessel to the mandibles and then join each other behind the muscles which pass through the nervous system behind the trito-cerebral commissure (Figs. 4 A, 5). At the same time they open into the body cavity directly underneath the main mass of the tendon of the adductor muscle. The aorta

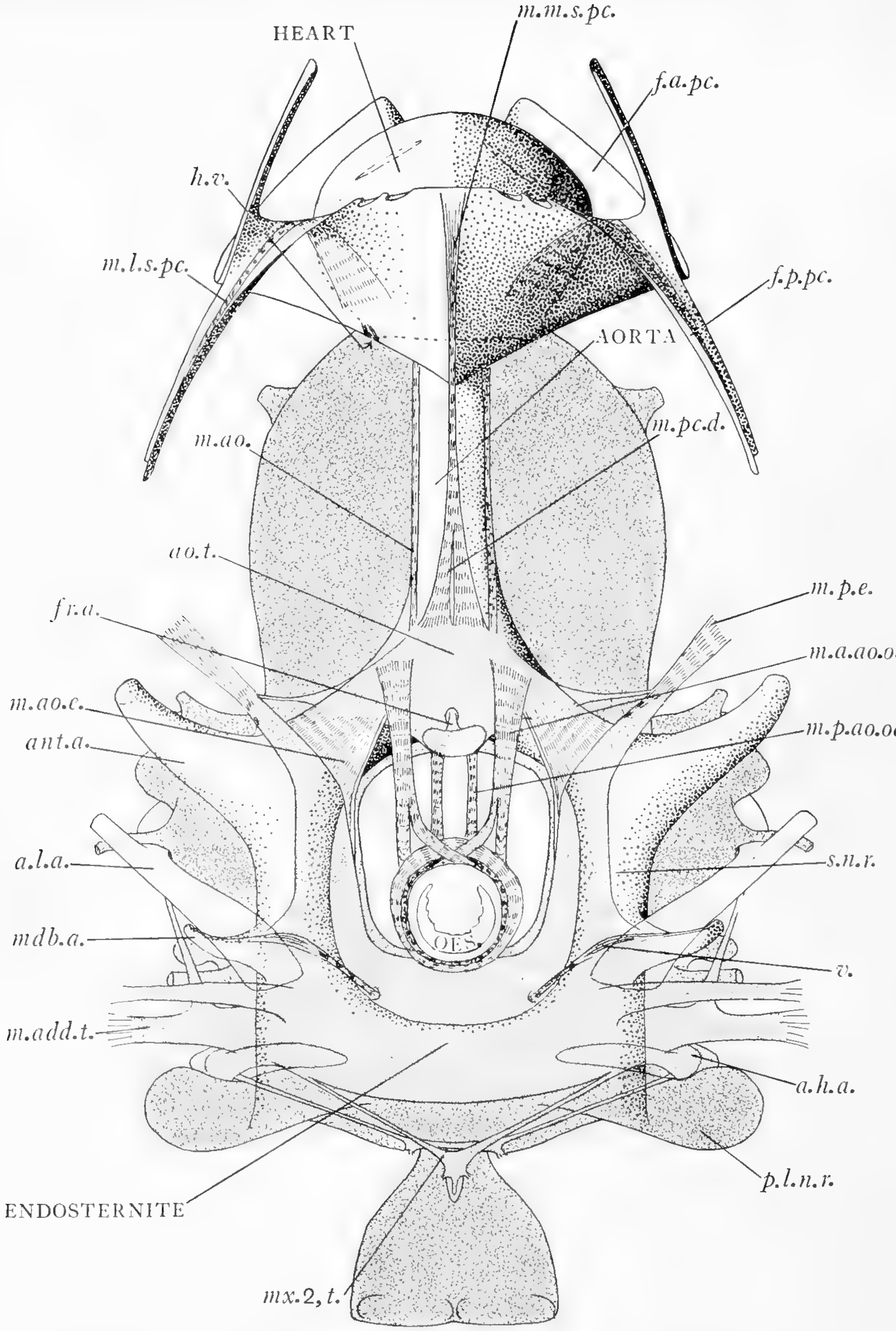

Fig. 5. Dorsal aspect of blood system of *Doloria levis* to show the associated musculature and the endosternite. *a.h.a.* anterior hypostomal apodeme; *a.l.a.* antenno-labral apodeme; *ant.a.* antennal artery; *ao.t.* aortic tendon; *f.a.pc.* floor of anterior pericardium; *f.p.pc.* floor of posterior pericardium; *fr.a.* frontal apodeme; *h.v.* hepatic valve; *m.a.ao.oe.* anterior aortic-oesophageal muscle; *m.add.t.* tendon of adductor muscle; *m.ao.* aortic muscle; *m.ao.e.* aortic-endosternite muscle; *m.l.s.pc.* lateral sub-pericardial muscle; *m.m.s.pc.* median sub-pericardial muscle; *m.p.ao.oe.* posterior aortic-oesophageal muscle; *m.p.e.* posterior eye muscle; *m.pc.d.* pericardial dilator; *mdb.a.* mandibular artery; *mx.* 2, *t.* tendinous plate for attachment of muscles of vibratory plate of maxilla; *p.l.n.r.* posterior lobe of nerve ring; *s.n.r.* supra-neural ring vessel; *v.* valve in supraneural vessel. (× 200 approx.)

thus joins a ring vessel and, since this lies immediately above the nerve ring, I have called it the supraneural ring or artery.

The anterior part of the supraneural artery is provided with a complex of muscles (Figs. 4 A, 5) attached partly to the endosternite and partly to the ectoderm of the oesophagus. One of these consists of a thin sheet of myofibrils developed in its roof running from the prong of the endosternite to the aortic tendon. I have called it the aortic-endosternite muscle. The endosternite prongs turn outwards at an angle about the middle of their length and, along the inner edges of the distal halves, are attached the aortic-endosternite muscles.

A narrow strip along the inner edges of these muscles appears to contain myofibrils which differ from the remainder of the muscle. The latter are striated, but the former are homogeneous and stain a very bright red, which contrasts clearly with the purplish red of the rest of the muscle. They appear to be of the same type as the musculature I shall describe (p. 463) for the gut. These narrow strips converge on the middle point of the aortic tendon and join the aortic muscles.

At a region just behind and slightly lateral to the attachment of the aortic muscles, two muscles originate which pass backwards dorsal to the aortic-endosternite muscles and then extend down the oesophagus to end against its cuticular lining. These I have called the anterior aortic-oesophageal muscles. Each splits into two portions, one of which extends round the sides of the oesophagus and passes down its posterior side. The second extends straight down the front of the oesophagus and crosses from one side of the body to the other.

From the hinder margin of the aortic tendon, on either side of the frontal apodeme, a pair of muscles, the posterior aortic-oesophageal muscles, run directly down the front of the oesophagus.

All the aortic-oesophageal muscles insert themselves between the circular muscles, pass through the longitudinal muscles, and attach to the cuticular lining of the oesophagus.

A pair of valves occur in the supraneural ring (Figs. 4 A, 5, and Plate VII, fig. 1, *c*) on either side at the level of the hinder face of the oesophagus. Each consists of a muscular curtain hanging down from the roof of the artery. The muscle is attached anteriorly to the wall of the mandibular artery and, in curving upwards over the supraneural vessel, it passes obliquely backwards and inwards. It narrows down and curves ventrally to attach to the hinder of the muscles which pass through the nervous mass behind the tritocerebral commissure. Contraction of this muscle must pull down the muscle curtain so that it presses against the floor of the artery and blocks the passage. This can be seen in Plate VII, fig. 1, in which that part of the supraneural artery proximal to the heart is empty, but on the distal side of the valve there is a mass of coagulated blood.

The antennal arteries extend laterally and then forwards into the base of the limbs (Fig. 11). On entering they apparently divide into two. The outer, smaller branch, appears to open into the cavity of the limb, but the inner can be followed into the cyto-

plasm of a large muscle on the inner side of the protopodite. This muscle, which is the largest in the limb, consists of a number of pillars of striated myofibrils arranged in the form of a fan. Their cytoplasm, however, forms a continuous sheet on their inner face, and it is into this sheet that the antennal artery can be traced as a thin slit which gradually tapers and disappears.

I have now described all the arteries which can be traced from the heart. In addition to this system of vessels, blood leaves the heart by the hepatic valves and is pumped directly into the gut parenchyma. This tissue is described later (p. 464). The actual passage of blood through the parenchyma cannot be traced in *Doloria*, but in another unnamed Cypridinid from South Georgia I traced definite sinuses extending from the hepatic valves to a region under the gut. Presumably the blood forced into the parenchyma oozes out through the crevices between the parenchymatous cells.

Blood returns to the heart by the pericardium, and this has two entrances. The first I have already described, namely, *via* the posterior pericardium. The second occurs anteriorly, and leads from the cavities of the carapace valves. Blood enters the carapace directly from the body cavity at the attachment of the adductor muscles. In addition, a tongue of gut parenchyma passes into the valves alongside the adductor muscle, and so blood may pass into the valves from this tissue. From this point there is a system of radiating channels in the thickness of the carapace valves. These were mentioned by Claus (1876, p. 93) in a footnote. They extend outwards to the edges of the valves, where they join to a marginal vessel. This is most marked anteriorly and has been figured by Müller (1894, Pl. 2, fig. 2) who, however, does not describe it. These marginal sinuses extend up the anterior edges of the valves, past the antennal notches, and open directly into the pericardium at the combined attachment of the aortic and nauplius eye muscles (Fig. 4 A). The entrance of each sinus into the pericardium is guarded by a minute muscle which runs from the floor of the sinus obliquely backwards and outwards to the outer layer of the carapace, and attaches alongside the attachment of the second dorsal longitudinal muscle. Contraction of this muscle must pull up the floor of the sinuses, and so close the entrance to the pericardium.

CIRCULATORY PROCESS

From the arrangement of the muscles associated with the pericardium and arteries, I believe it is possible to analyse the process by which the blood is pumped round the body.

The attachments of the pericardial dilator indicate that, on contraction, the pericardial floor must be pulled down and the pericardial space thus enlarged. Similarly, the attachments of the pericardial compressors show that they must function by pulling in the walls of the pericardium, thus diminishing the pericardial space. A regular alternate contraction of these two muscles would then produce a rhythmical diastole and systole of the pericardium. At first sight this seems the obvious method of working, but, as I shall attempt to show, such a method is not possible.

I assume that these muscles contract rhythmically and synchronously with the heart.

The first possibility is that the heart contracts as the pericardium enlarges, and *vice versa*. This appears impossible because of the nature of the cardiac valves. The aortic valve is simply a median split in the pericardial floor, the lips of which are muscular extensions of the pericardial dilator. Now the myofibrils of this muscle run upwards and spread out towards the attachment to the pericardial floor. Here a small band runs forwards (Figs. 2, 4 A) and splits into two as the myofibrils supporting the lips

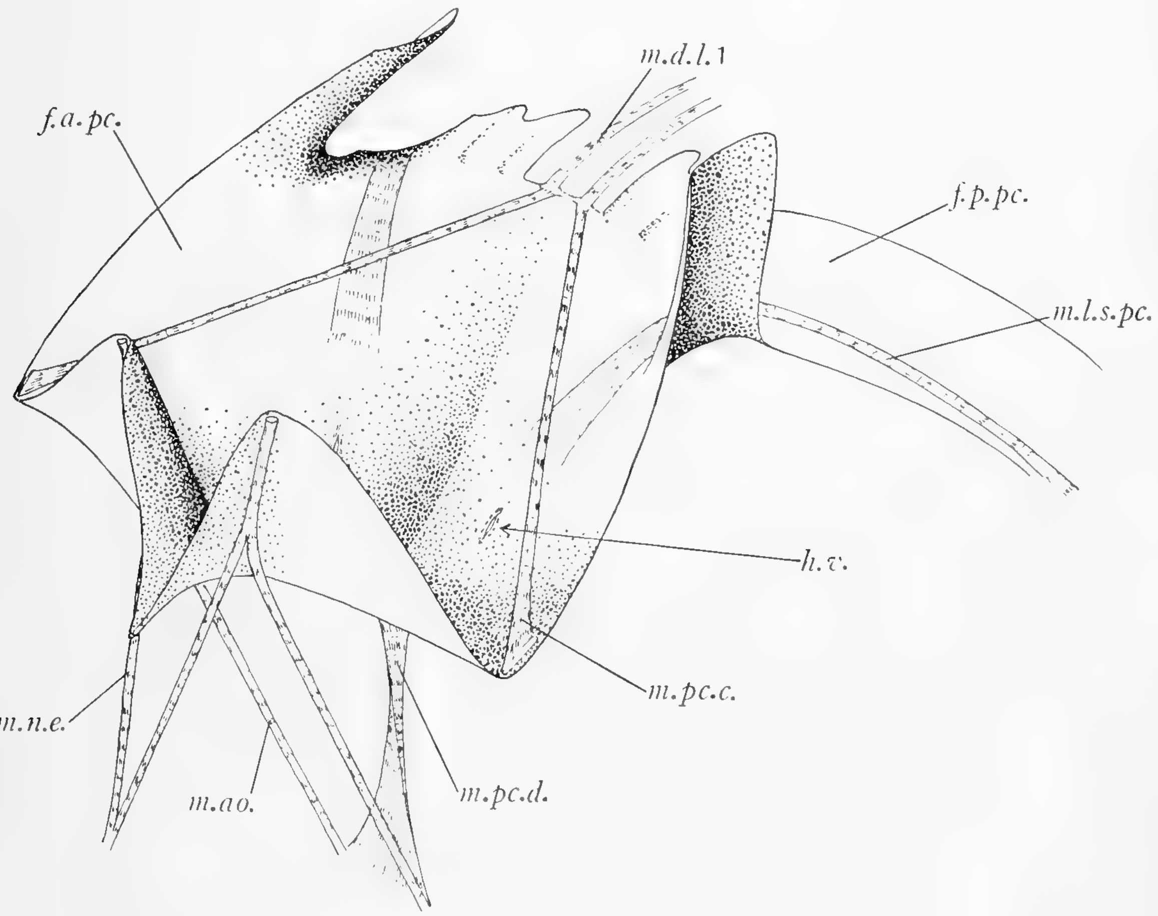

Fig. 6. Perspective view of pericardial floor, based on an isometric projection, to show the attachments of the pericardial compressor. *f.a.pc.* floor of anterior pericardium; *f.p.pc.* floor of posterior pericardium; *h.v.* hepatic valve; *m.ao.* aortic muscle; *m.d.l.* 1, 1st dorsal longitudinal muscle; *m.l.s.pc.* lateral sub-pericardial muscle; *m.n.e.* nauplius eye muscle; *m.pc.c.* pericardial compressor; *m.pc.d.* pericardial dilator.

of the aortic valve. The majority of the fibrils, however, converge and run upwards as the median sub-pericardial muscle. The direction of these fibrils can be established clearly with polarized light. From this arrangement it is clear that contraction of this muscle must pull the pericardial floor both downwards and backwards. This must tend to increase the pericardial space but, at the same time, the lips of the aortic valve will become tense and will be pulled close together in the middle line, thus shutting the valve. Similarly with the hepatic valves. Although the minute muscles of the latter appear to be isolated and not connected directly with any other muscle, it is reasonable

to suppose that any tension on the pericardial floor, such as must occur on contraction of the pericardial dilator, would also cause these valves to close.

It thus appears that, when the pericardial dilator contracts, the cardiac valves must close, and hence that the heart cannot be in systole. This leads to the second possibility that the heart and pericardium contract and dilate together.

It is quite possible for the heart and pericardium to contract together, but they cannot dilate together. The expansion of the heart must be passive. There are no muscles attached to its walls by which it could be actively dilated, and the structure of the parenchymatous cells covering the outer surface of the heart is such that they could not exert any tension on the heart walls. This being so, the pressure around the heart as it expands must be the same as, or slightly higher than, the pressure in the heart. Only in these circumstances could the ostia open and allow blood to pass in, and the two ostia are the only entrances to the heart, the aortic and hepatic valves being closed by the contracting pericardial dilator. Now enlargement of the pericardium would tend to make this a region of low pressure. Blood would tend to be sucked in from all possible sources. That is, blood would tend to be sucked out of the passively expanding heart, and this would immediately close the ostia.

The conclusion of the above reasoning is that there can be no diastole and systole of the pericardium synchronous with that of the heart. There is still another possibility, namely, that the volume of the pericardium remains practically constant, and this I believe actually to be the case. The pericardial muscles, by their activity, control the volume and internal pressure of the pericardium, so that the heart is free to pulsate and, at the same time, blood is admitted to replace that forced out by the heart.

I suggest that the pericardial dilator and the compressors contract together during diastole of the heart.

At the sides of the attachment of the median sub-pericardial muscle are the attachments of the pericardial compressors which run forwards and outwards to their anterior attachments in the lateral walls of the pericardium. Contraction of the latter muscles will thus pull inwards both the lateral and the posterior walls of the pericardium, and so tend to reduce the pericardial space.

Also the upper attachment of the median sub-pericardial muscle is in the middle point of the lower edge of the soft flexible hinder wall of the pericardium. Hence, contraction of the pericardial dilator, through this muscle, will pull downwards and slightly forwards the hinder wall and this will tend to counteract, but only slightly, the enlarging effect of the dilator muscle.

Thus I deduce that contraction of the pericardial dilator closes the aortic valve and, therefore, that during this contraction the heart must be dilating. At the same time, it must tend to increase the pericardial space and so diminish the intra-pericardial pressure. But, if this were to happen, the heart could not dilate. Hence, to counteract this, the pericardial compressors contract and so, during diastole, both the pericardial dilator and the pericardial compressors contract.

During systole these muscles relax. An antagonistic muscle common to both of them is the first dorsal longitudinal muscle. Contraction of this muscle will pull back the hinder wall of the pericardium which has been pulled forwards during diastole.

The relaxation of the pericardial dilator relieves the tension on the valves, and so allows blood to be pumped by the heart into the aorta and in smaller quantities into the gut parenchyma.

Blood must at this stage pass into the pericardium to replace that forced out by the heart. Some will pass in direct from the marginal sinuses, but not at any great rate, as such blood must be sucked through the network of minute channels in the valves. I believe that it passes in chiefly through the posterior pericardium. In the floor of this part of the pericardium lie the lateral sub-pericardial muscles. These curve upwards from their position of origin in the ectoderm over the floor of the posterior pericardium and down again to attach to and merge into the floor of the anterior pericardium (Figs. 2, 4 A, 5, 6). Hence, on contraction, each must pull down its middle portion, that is, the portion lying over the floor of the posterior pericardium, and so convert this space into a tube leading directly into the anterior pericardium.

It is possible that, to a slight extent, as the floor is depressed, the roof of the posterior pericardium is lifted up by the contracting first dorsal longitudinal muscle. From Figs. 2 and 4 A it can be seen that the commencement of this muscle slopes markedly upwards, and so must tend to lift up the body wall covering the posterior pericardium.

To summarize the suggested interaction of heart and pericardium, during diastole both pericardial dilator and compressors contract. During systole these muscles relax and the lateral sub-pericardial muscles contract, thus allowing blood to enter the pericardium from the main body cavity.

The further passage of blood from the heart through the vessels into the body cavity can, I think, be predicted with a certain degree of accuracy.

The roof of the aorta is attached to the pericardial floor. Since, during systole, the latter is raised the roof of the aorta must also be lifted up and, in this way, the volume of the anterior part of the aorta is enlarged and accommodates the blood forced out of the heart. This follows necessarily if the suggested working of the heart and pericardium is accepted. As will be seen later, I believe that, during this phase, the hinder part of the aorta is occluded by its roof being pulled down on to its floor by contraction of all the aortic muscles (Fig. 7 A).

At the commencement of diastole then, the anterior aorta will be swollen with blood. The pericardial dilator will now commence to contract and the aortic musculature will relax. This will cause three things. The aortic valve will close. The pericardial floor will be pulled downwards on to the anterior part of the aorta and the aortic tendon and hence the roof of the hinder part of the aorta will be raised. The aorta will thus tend to be occluded anteriorly and opened up posteriorly. Hence blood will be forced backwards into the hind end of the aorta, and the anterior part of the supraneural ring (Fig. 7 B, C).

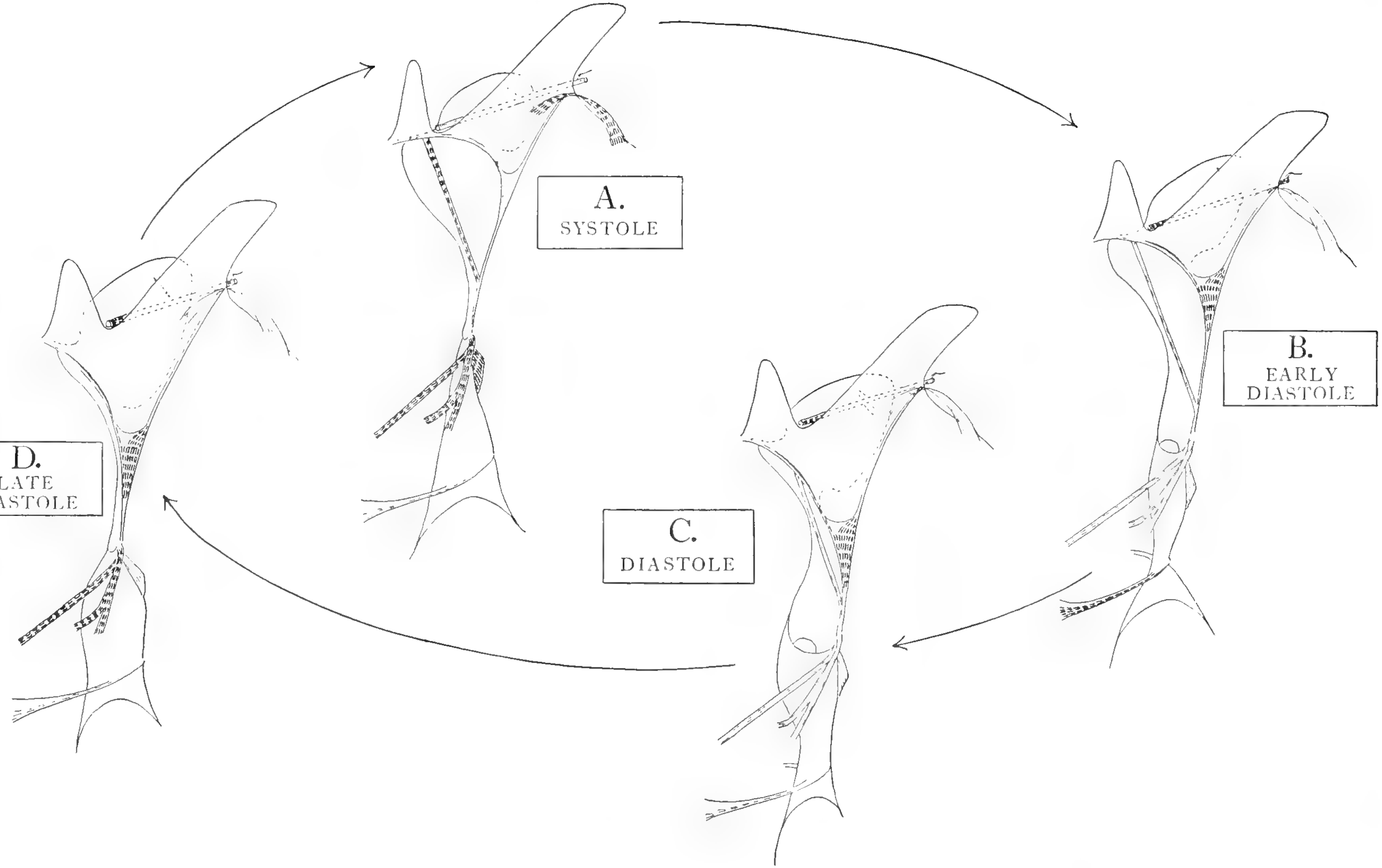

Fig. 7. Diagram illustrating four stages in the suggested circulatory process. The muscles which are contracting are heavily, and those which are relaxing lightly, shaded. For identification of muscles, compare B (Early Diastole) with Fig. 3 A.

Towards the end of diastole, when the pericardial dilator is fully contracted, the posterior aortic-oesophageal muscles and the aortic muscles will contract. This will bring the aortic tendon down on to the floor of the aorta and so squeeze the blood laterally into the anterior part of the supraneural vessel (Fig. 7 D). The aorta will thus be closed posteriorly and, at the same time, the contraction of the aortic muscles, since these are attached further apart at their anterior ends than posteriorly, will cause the anterior part of the aorta to widen and so accommodate the blood forced out at the commencement of systole.

Systole now commences, and the blood from the previous systole has reached the anterior part of the supraneural artery. This blood is now forced backwards by contraction of the anterior aortic-oesophageal muscles and the aortic-endosternite muscles (Fig. 7 A). From Fig. 5 it can be seen that contraction of these muscles will pull backwards the anterior faces of the laterally running part of the supraneural vessel on to the posterior. Thus, just as the hinder part of the aorta was occluded, so now the anterior part of the supraneural ring will be emptied and the blood passed backwards.

When it reaches the body cavity at the hind end of the supraneural artery the valves in this vessel will close. The aortic musculature now relaxes (Fig. 7 B). This opens up the posterior part of the aorta. Blood cannot pass forwards into this region from the body cavity because the supraneural valves are closed but, as I have already explained, it will become filled with blood from the anterior end of the aorta by the downward pressure of the pericardial floor.

As the anterior end of the supraneural vessel is emptied, part of the blood, instead of passing backwards, will be forced laterally into the antennal arteries. At the point in these vessels where they turn sharply forwards into the bases of the antennae there is a muscular system which may act as a valve, but I could not settle its structure with certainty.

I have now described in detail what I consider to be the most probable mode of action of the complicated system of muscles in the heart, pericardium and blood vessels. The whole argument is based on the premise that the muscles contract synchronously with the heart. On this assumption, the action of heart and pericardium which I have described is, as far as I can see, the only possible method. The action of the muscles of the blood vessels is simply a method which appears to me to be probable.

The presence of a circulatory system accessory to the heart is not surprising when the diameter of the blood vessels and the probable rate of heart beat are taken into account. In all observed cases of Ostracods the pulse is very rapid—Müller (1894, p. 169) records 200 heart beats per minute in *Cylindroleberis oblonga*—while the aorta of *Doloria* is certainly not more than 50 μ in diameter. In these conditions the viscous resistance of the blood in the capillary aorta would entirely prevent the heart beating at any speed, were there not some accessory system to help the blood through the vessels once it had left the heart. A similar condition has been described in *Argulus* by Wilson (1903, p. 690), who points out that the lacunar circulation in this form cannot depend on the heart alone for the movement of blood round the body, but must be assisted by rhythmical contractions of the muscles of the body.

From a morphological standpoint, one of the chief features of the blood system is that, if the mechanism I have suggested is correct, circulation would still be possible in complete absence of the heart. Thus blood is sucked into the pericardium independently of the heart and would pass into the aorta whether the heart were there or not, since the aortic valve is part of the pericardial floor, and is controlled by the pericardial dilator. And, further, the presence of valves in the supraneural vessel would ensure a one-way circulation in the absence of the heart with its ostia. This is significant from the fact that, in certain groups of Ostracods, the heart is entirely absent. In these forms it is possible that the pericardial floor and vessels may yet be present.

GUT

The labrum has already been described (p. 438). The labral glands will not be dealt with, as they have been investigated so often before in other Cypridinids (Newton Harvey, 1919).

The gut consists of a well-defined oesophagus, leading into a globular stomach, which merges into an extremely short hind gut opening at the anus just in front of the caudal furca.

The oesophagus exhibits a typical structure. Its anterior wall is thickened and bulges posteriorly, converting the lumen into a cavity, moon-shaped in section. The whole oesophagus is lined by very thin chitin and the bulge on the anterior wall extends a short distance into the stomach. The aortic muscles which extend down and attach to the oesophagus have already been described. Outside these there is a series of circular muscles and, in addition, various dilator muscles which run to the anterior walls of the labrum.

The stomach, as in most Cypridinids, has no hepatic outgrowths, but is completely enveloped in a mass of tissue which I have called the gut parenchyma. It is obvious, even from the small amount of material at my disposal, that this tissue varies considerably, not only in its staining reaction, but in its bulk. In two of my specimens it almost obliterates the body cavity, while in the specimen figured in Fig. 8 there is a large blood space between it and the body wall. A description of the variation based on my material would be of little use but, since it probably is an indication of food storage, an investigation of this point will be interesting when further material is available.

In Fig. 8 I have drawn a section which exhibits all the cellular elements to be found in the gut and its parenchyma. The gut epithelium consists of a uniform layer of tall columnar cells, the cytoplasm of which is heavily vacuolated. It is separated from the parenchyma by a network of muscles but, as will be seen from the figure, this separation is not very marked. There is no basement membrane as described by Lüders (1909, p. 113) in *Gigantocypris*. The bases of the cells may even in places bulge through the network, so that they interdigitate with the inner layer of gut parenchyma cells. This agrees with Müller's description of *Gigantocypris* (1895, p. 159), where he describes a "strukturlosen, starkgefalteten Membran" at the base of the gut epithelium.

The muscle layer consists of a network of comparatively thick, circular and longitudinal strands, which I call muscles because they correspond in position to the gut

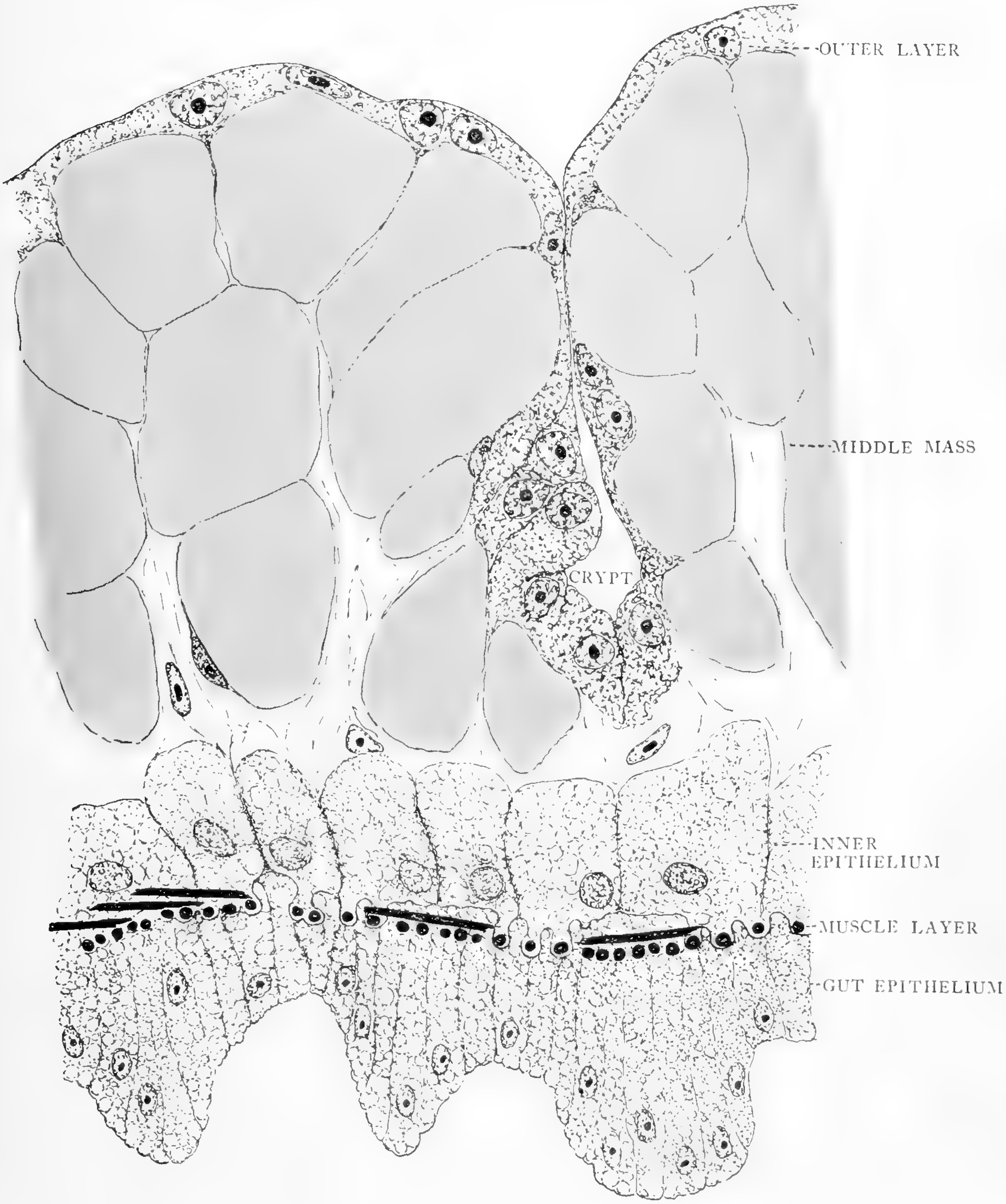

Fig. 8. Transverse section through gut wall and parenchyma. (× 666.)

musculature of other Crustacea, but they exhibit no trace whatever of any form of striation. In sections stained with Mallory each strand appears a brilliant red and perfectly homogeneous. Further, fixed preparations of true muscles always show the

muscle running straight from one point of attachment to the other. Now, in one of my preparations, which is exceptionally well fixed, certain of the longitudinal strands form loops which follow the bulges of the gut epithelial cells into the parenchyma. However, certain of the longitudinal strands can be traced forwards down the oesophagus and backwards to the anus, and in these regions they stain a purplish red and exhibit a typical striation. Certain of the transverse strands in the proctodaeal region appear as slings for the gut. In the median region they support the gut epithelium and are homogeneous. Laterally, they leave the gut musculature and attach to the body wall, and in so doing exhibit a complete striation. I could find no nuclei in association with the muscle strands.

I know of no similar musculature in any other Crustacean, but in the young larva of *Estheria*, before any true gut musculature was formed, I described (1924, p. 399) long, homogeneous strands extending forwards over the surface of the gut from the proctodaeal musculature.

Lüders (1909, p. 113), in his description of *Gigantocypris agassizii*, describes a muscle layer in a similar position, but does not mention the chequer arrangement of the muscles or comment on any peculiarity of the individual strands. It is stated by Lüders (1909, p. 113) that, according to Müller, *Gigantocypris pellucida* differs from *Gigantocypris agassizii* in lacking this muscle layer. It may be that the homogeneity of the muscles rendered them non-staining in the technique he employed. The staining reaction in my material differed markedly in different specimens. In the best the staining was intense, but in others not so well fixed, the musculature stained a pale orange and was difficult to distinguish.

The gut parenchyma is composed of three zones, an inner epithelium, a middle mass and an outer layer.

The inner epithelium consists of a layer of very large cells covering the gut musculature (Fig. 8). As already described the bases of these cells interdigitate with the bases of the gut epithelial cells. The actual position of the gut musculature in relation to these two epithelia is uncertain. It probably lies in between the two, but, in sections, it appears as if the muscle strands actually pass through the cytoplasm of the cells of one or other of the epithelia.

The middle mass contains two distinct types of cell. The first, a large cell enormously distended with coagulable matter. These I call reserve cells and they form the main bulk of the parenchyma. Their nuclei are very much flattened, presumably owing to the distension of the cell body, and stain intensely. The second can only be identified from their nuclei, which have well-defined nucleoli and do not stain intensely. These, I believe, form the walls of a system of ramifying lacunae and canaliculi which lie in the interstices between the reserve cells. It is into this system that the blood is passed from the heart through the hepatic valves.

The outer layer of cells forms an epithelium covering the whole of the gut parenchyma. The cells are for the most part flattened, but in places the layer dips down into a crypt (Fig. 8) and the cells become more polyhedral. Also posteriorly there is

a zone where this layer is thickened and extends inwards to the inner epithelium, and here the cells have a similar shape.

The gut parenchyma is produced postero-dorsally in a series of five ridges, which extend up and attach to the body wall in between the dorsal longitudinal muscles. In this way the body cavity is divided up into a series of aisles. Each ridge consists of a plate of reserve cells covered by a very attenuated layer of the outer epithelium.

Laterally the parenchyma sends an outgrowth on either side, which extends a short distance into the valves.

Anteriorly the gut parenchyma sends outgrowths towards the pericardium, along the aorta and to the antennal glands in the basal joints of the antennae.

The aortic outgrowths lie close against the aorta, and extend to the anterior limit where the latter ends blindly. The pericardial outgrowths extend up to the hepatic valves (Fig. 11), and along their length there is a well-defined channel connecting the heart directly with the canalicular system of the parenchyma.

The antennal outgrowths extend into the base of the antenna and surround the duct of the antennal gland and the basal ganglion of the antenna. They differ in constitution from the rest. They contain no reserve cells, or, if they do, they contain no coagulable staining matter. They consist simply of large polyhedral cells which stain very faintly and resemble the cells which have already been mentioned as surrounding the heart.

NERVOUS SYSTEM

The anatomy of the nervous system of Ostracods and more particularly of Cypridinids is very incompletely known. Müller (1894, Pl. 40, fig. 10) published a figure showing the general structure of the nervous system of *Pyrocypris punctata*, but did not describe it in any detail, and it is on this figure that Klie, in a recent paper (1929, p. 39), bases his general account. The most complete description of any Ostracod nervous system is that of *Gigantocypris* published by Lüders (1909), but he had very little material and apparently was unable to cut many sections.

Recently Hanström has published several accounts (1924, 1927 and 1928), basing his observations on *Eucypris fuscata* and *Philomedes globosa*, but he deals chiefly with the internal arrangement of the nerve centres and fibre tracts. Apparently, however (1927, p. 240), he experienced great difficulty in fixation, and has not yet obtained a series of sections from which he can describe the finer histological detail.

Claus (1891) described in fair detail the anatomy of the Halocyprid nervous system, and includes a figure of a section of the brain of *Cypridina mediterranea*.

EXTERNAL ANATOMY

The present description is based on a wax model, reconstructed from a series of sections frontal to the nerve ring.

The shape of the central nervous system can be seen from Figs. 9 and 10. It consists of a massive circum-oesophageal ring to which is attached posteriorly, by a pair of short stalks, all that remains of the ventral chain of ganglia.

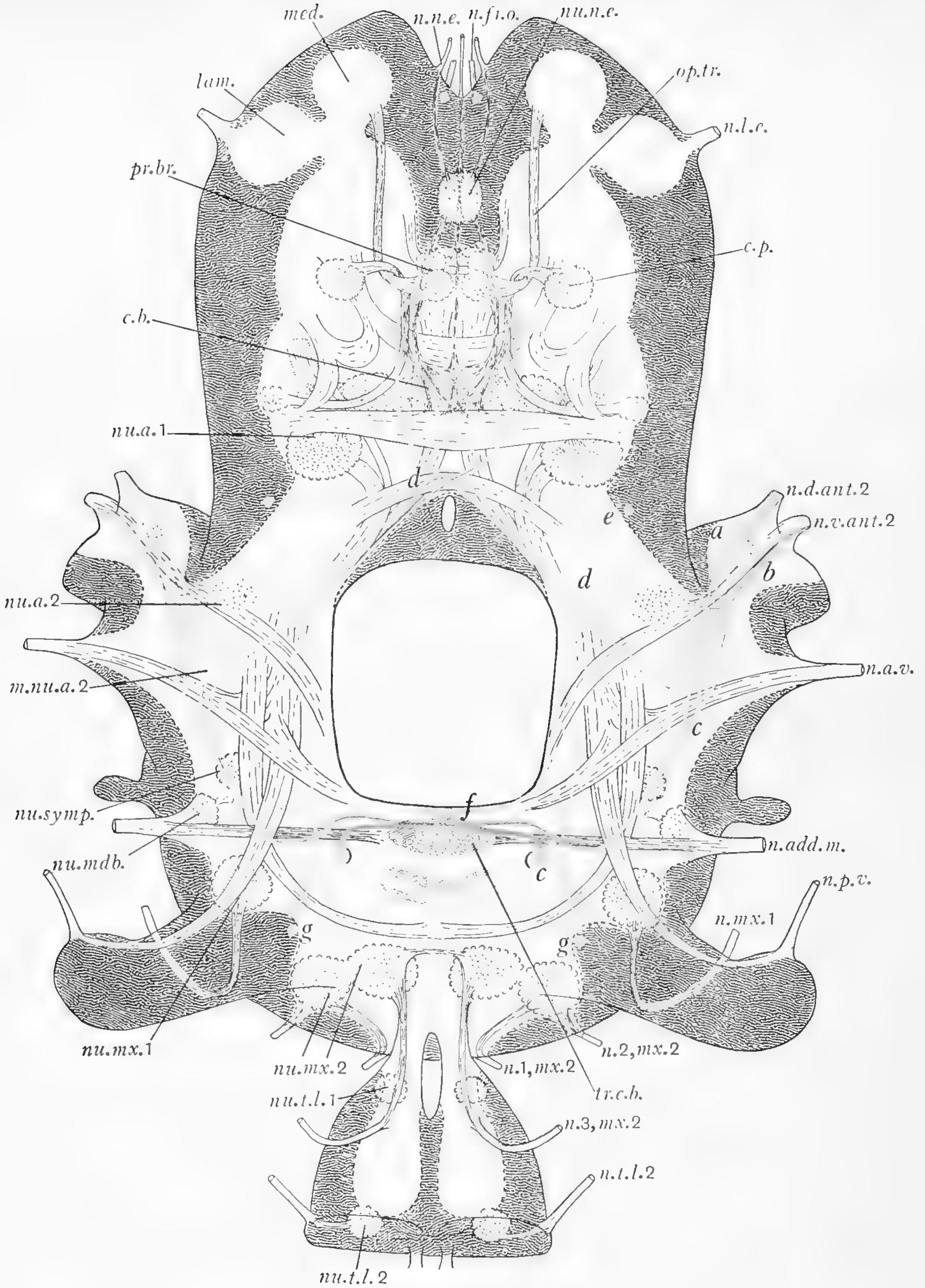

Fig. 9. Dorsal aspect of nervous system of *Doloria levis* to show nerve roots, the main nuclei and the giant fibre system (green). *c.b.* central body; *c.p.* corpora pedunculata; *lam.* lamina of optic lobe; *m.nu.a.* 2, motor nucleus of antenna; *med.* medulla of optic lobe; *n.* 1, *mx.* 2, *n.* 2, *mx.* 2, *n.* 3, *mx.* 2, first, second and third maxillary nerves; *n.a.v.* anterior valve nerve; *n.add.m.* adductor muscle nerve; *n.d.ant.* 2, dorsal antennal nerve; *n.fr.o.* frontal organ nerve; *n.l.e.* optic nerve; *n.mx.* 1. maxillulary nerve; *n.n.e.* nerves to nauplius eye; *n.p.v.* posterior valve nerve; *n.t.l.* 2, 2nd trunk limb nerve; *n.v.ant.* 2, ventral antennal nerve; *nu.a.* 1, nucleus of antennule; *nu.a.* 2, nucleus of antenna; *nu.mdb.* nucleus of mandible; *nu.mx.* 1, nucleus of maxillule; *nu.mx.* 2, nucleus of maxilla; *nu.n.e.* nucleus of nauplius eye; *nu.symp.* nucleus of sympathetic system; *nu.t.l.* 1, nucleus of first trunk limb; *nu.t.l.* 2, nucleus of second trunk limb; *op.tr.* optic tract; *pr.br.* protocerebral bridge; *tr.c.b.* tritocerebral central body. (× 260 approx.)

The fore-part of the ring consists of the fused optic and protocerebral lobes. Between the tips of these lobes there arise five nerves (Fig. 9), three running to the three divisions of the nauplius eye and two arising more ventrally and passing to the frontal organ (Fig. 2). Laterally, the optic lobes give rise to the short eye stalks of the paired eyes.

On the ventral side of the fore-part of the nerve ring there are two swellings from which the antennulary nerves arise. This marks the deuterocerebral part of the brain, and in the hinder part of this region there is a small median aperture through which passes the frontal apodeme and a portion of the sympathetic system. This aperture is probably of little morphological significance as no fibres pass behind it.

The deuterocerebral lobes pass postero-laterally into the tritocerebral region. There is no marked waist between these regions, so that Hanström (1924, p. 32) is not strictly correct when he states that, apart from the Phyllopoda, the Ostracods are the only Crustacea which show a distinct separation between these two parts of the brain. The tritocerebral lobes extend backwards and meet behind the oesophagus, thus forming the anterior part of the hinder half of the nerve ring. The division between the tritocerebral commissure and the more posterior nervous mass is not marked by a gap, but by a pair of muscles which pass through the nervous system. These have already been mentioned (p. 453) in connection with the blood system, and are shown in Fig. 4 A.

The nerves arising from the tritocerebral lobes are, anteriorly, the antennal nerves which have double roots and, postero-dorsally, a pair of massive nerves which pass outwards to the attachment of the adductor muscle where they enter the carapace. In parasagittal sections they can be traced spreading out towards the margins of the valves. I have called them the anterior valve nerves. Immediately below the latter a small nerve emerges which runs to the posterior muscles of the base of the antenna.

On the ventral side of the hinder half of the nerve ring there are two swellings, from which arise the mandibular nerves and the roots of the sympathetic system (Fig. 10 A, B). These are on the same level as the muscles which mark the hinder limit of the tritocerebral commissure. Just in front of them there are two small laterally projecting lobes. They are probably of little significance, as no nerves arise from them and they contain no fibre tracts.

The postero-lateral corners of the nerve ring are marked by two prominent lobes—the posterior lobes—which curve round the anterior hypostomal apodemes. They have been figured by Müller (1894, Plate 40, fig. 10). These lobes, together with the small lobes at the sides of the mandibular swellings, do not represent any special division of the nervous system, and probably arose mechanically as a result of the extreme condensation of the anterior part of the ventral chain.

Immediately above the mandibular swellings, and near the dorsal surface of the nerve ring, are the roots of two massive nerves which extend laterally and innervate the adductor muscle. These nerves correspond to Turner's "thoracic nerve" (1896, p. 31) and to Klie's "shell nerve" (1926, p. 23).

From the dorsal tip of the posterior lobe a nerve runs obliquely forwards and enters the shell at the adductor muscle attachment. It spreads out to the margins of the valves,

and is a posterior valve nerve. From the lower edge of the stalk of the posterior lobe a nerve curves forwards around the anterior hypostomal apodeme and runs to the maxillule.

From the hinder margin of the nerve ring there arise two pairs of nerves, one situated just below the paired stalk of the ventral chain, and another pair more laterally. They are the first and second maxillary nerves.

The remainder of the ventral chain consists of a nervous mass which is triangular in both dorsal and lateral aspects (Figs. 9, 10 B). It is joined to the nerve ring by the paired stalk already mentioned, and is more condensed than in any other Cypridinid I have studied.

Ventrally, at the root of the stalk, it gives rise to the small nerves running to the first trunk limbs. Dorsally at about the middle of its length there are two small swellings, from which arise a pair of nerves which run forwards, the third maxillary nerves. These innervate the musculature of the vibratory plate and, in addition, the most dorsal component of the adductor muscle which attaches above the apodeme joining the *d* and *e* sclerites. Postero-laterally there arise the nerves to the second trunk limbs. Dorsally, at the morphologically posterior end, there is an irregular connection to a group of nerve cells in the caudal furca, but I have not been able to follow the details in this region with certainty.

The nerves which I have described have been figured by Lüders in *Gigantocypris* in the same relative positions, with the exception of the three largest, the adductor muscle nerve and the anterior and posterior valve nerves.

BASAL GANGLION SYSTEM

The nervous system of *Doloria* is peculiar in that each segmental nerve swells out into a ganglion in the base of the limb it supplies. These ganglia I call the basal ganglia.

A ganglion at the base of the antennule has been described in many Crustacea. A ganglion in the base of the antenna is figured by Claus in Halocyprids (1891, Plate 1), and Lüders (1909, p. 136) mentions a basal ganglion occurring in the fused bases of the first trunk limbs (his second thoracic limb), but these authors do not comment upon the occurrence of these ganglia. So far as I am aware no Crustacean has been described with basal ganglia in all its limbs.

From sections of *Gigantocypris*, also collected by the Discovery expedition, I find that a similar series of ganglia occurs in this form, but I have not yet examined the sections in detail.

The antennulary basal ganglion is the largest in the body, occupying most of the basal joint. Certain fibres pass directly through the ganglion to the muscles (Fig. 10 A). These probably represent the motor nerves, and may correspond to one of the pair of nerves in those forms where antennulary nerves with double roots have been described (Hanström, 1924, Figs. 1, 2). Other fibres on entering the ganglion from the antennulary nerve turn sharply inwards, and appear to terminate in cells in the postero-medial corner of the ganglion. From this region other fibres extend to the distal end of the

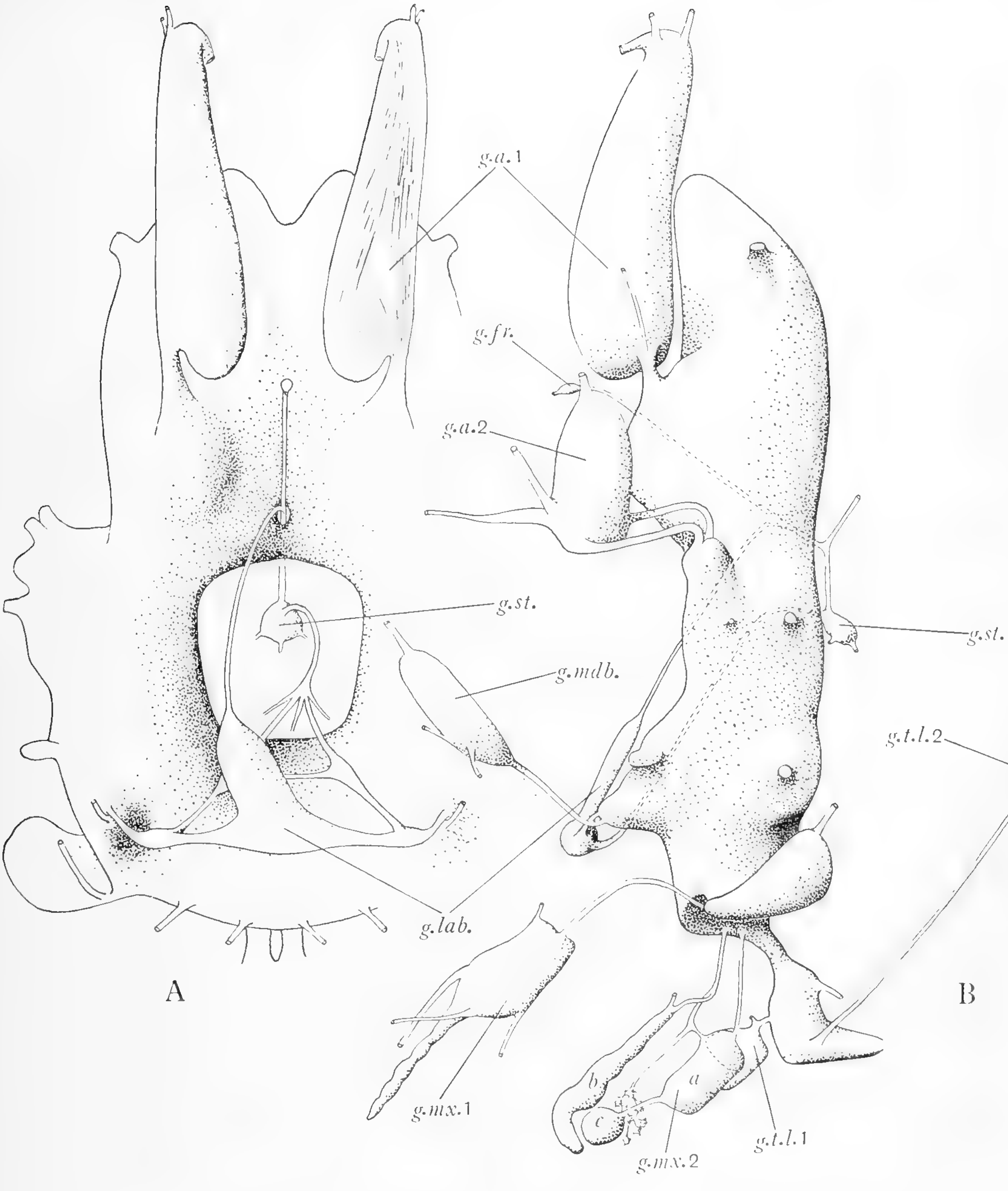

Fig. 10. Ventral (A) and lateral (B) views of the nervous system of *Doloria levis* to show the basal ganglia and sympathetic system. In A the fibre tracts of the left antennulary basal ganglion are shown. *g.a.* 1, antennulary basal ganglion; *g.a.* 2, antennal basal ganglion; *g.fr.* frontal ganglion; *g.lab.* labral ganglion; *g.mdb.* mandibular basal ganglion; *g.mx.* 1, maxillulary basal ganglion; *g.mx.* 2, maxillary basal ganglion; *g.st.* stomach ganglion; *g.t.l.* 1, basal ganglion of first trunk limb; *g.t.l.* 2, basal ganglion of second trunk limb. (× 200 approx.)

ganglion, and pass out as a bundle which can be traced to the tip of the limb. In the angle between these two bundles of fibres there is a group of four or five bipolar cells, from which arise medium-sized giant fibres (Fig. 10 A, see later, p. 474).

The two roots of the antennal nerve fuse into a basal ganglion, more or less conical in shape, lying between the powerful muscles of the protopodite. The ganglion lies immediately in front of the antennal gland and is embedded in the peculiar tissue, an extension of the gut parenchyma, which I have already described.

The upper root of the antennal nerve consists of a bundle of five giant fibres. These pass directly through the basal ganglion (Fig. 11) and will be described in a later section. The lower root contains one giant fibre which also passes through, but its main mass consists of minute fibres which, on entering the ganglion, divide into four main tracts. These pass through the ganglion and emerge as radiating nerves which can be traced to the superficial parts of the limb. A minute nerve can be traced from the ganglion to the duct of the antennal gland (Fig. 11).

The mandibular basal ganglion is a compact ovoid mass occupying the proximal half of the basipodite. A tract of fibres passes through it, and bifurcates into a small branch running to the exopodite and a larger branch which can be traced to the tip of the endopodite.

The maxillulary basal ganglion is less compact than the mandibular ganglion. It is quite distinct in its proximal portion, but it tapers off distally into a string of nerve cells closely associated with large gland cells (Fig. 10 B).

In the maxilla there is no single basal ganglion, but rather a group of distinct ganglia connected by a network of anastomosing nerve cells. The second maxillary nerve passes down the front of the limb and, after giving off a small branch, extends as a chain of nerve cells to an elongated ganglion *b* which reaches the lower edge of the first joint. The first maxillary nerve passes to a compact ganglion *a* at the hinder margin of the first joint. From the lower corner of this ganglion a connective passes to a small subspherical ganglion *c*, lying just inside ganglion *b*. The second maxillary nerve, soon after entering the limb, gives off a thin branch which, after sending a connection to ganglion *a*, terminates in a plexus of nerve cells lying on the median side of ganglion *c*.

The first trunk limbs contain a conspicuous mass of gland cells, on the anterior face of which occurs a layer of nerve cells forming the basal ganglia of these limbs.

The basal ganglion of the second trunk limb—the brush limb—consists of a compact ovoid mass situated at the base of the limb.

The whole system of basal ganglia may be compared with the parapodial ganglia of Polychaetes or the ganglia at the base of the appendages of Tardigrades (Marcus, 1928). However, Dr Hanström has suggested to me that, strictly, they should not be called ganglia until it has been shown that they contain ganglion cells. The basal ganglion of the antennule has always been termed a ganglion, and we must use the term merely for convenience but, until the constitution of these basal ganglia has been studied by special neurological methods, the possibility remains that they are nothing more than accumulations of sensory cells which have passed in from their primitive superficial

position. This possibility is supported by the constitution of the maxillary basal ganglia, which are still partly a diffuse network of nerve cells lying close underneath the ectoderm. In this case they would not be physiologically comparable with the parapodial ganglia of Polychaetes in which ganglion cells occur (Hamaker, 1898).

If, however, they are simply accumulations of sensory cells, these cells cannot be the usual type of bipolar cells which are always figured in the Crustacean antennulary ganglion. For, in the latter ganglion of *Doloria*, as I have described, the bundle of fibres constituting the antennulary nerve bifurcates on entering the basal ganglion. One branch extends through the ganglion and the other curves round to the median posterior angle, and from this corner another set of fibres extends distally through the ganglion. Now these two sets of fibres must either belong to different groups of nerve cells, in which case it is probable that true ganglion cells are present in the basal ganglion, or else they must be the centrifugal and centripetal branches of unipolar cells situated in the corner of the ganglion. That is, they are axons of cells of the type usually described as characteristic of the vertebrate spinal ganglion (Parker, 1919, p. 211).

SYMPATHETIC SYSTEM

Hanström (1924, p. 33) has recently described in *Cypris fuscata* a labral ganglion (Lippenganglion), which is joined by a loop to the lower side of the posterior part of the circum-oesophageal commissure, the junction being marked by a swelling which he terms the visceral ganglion. Turner (1896, p. 30) describes a similar state of affairs. He mistakenly refers to the "*labial* nerve or nerve to the upper lip", but it is impossible from his figures to determine exactly what he was attempting to describe.

Lüders (1909, p. 137) describes a few minute median ganglia connected with the ventral chain in *Gigantocypris* which he terms sympathetic ganglia.

The sympathetic system of *Doloria* (Figs. 10 A, B) is well developed and agrees with that of other Crustacea. The mandibular swellings are connected by a loop, which originates just in front of the mandibular nerves and passes close against the front wall of the oesophagus, and which may be termed the labral loop. This is enlarged medianly into a ganglion, the labral ganglion, which extends a considerable distance dorsally just outside the circular muscles of the oesophagus. It continues upwards as a thin nerve to the frontal foramen of the brain (Fig. 10 A). Here it meets another nerve which extends from a small ganglion—the frontal ganglion—consisting of two or three cells, situated at the base of the frontal apodeme. The two nerves pass through the foramen, uniting in doing so, and are then joined by another nerve which can be traced to the aortic roof and the pericardial dilator. The fused nerves run backwards to a globular ganglion—the stomach ganglion—situated at the junction of oesophagus and stomach. This lies embedded in gut parenchyma between the aortic oesophageal muscles, and gives off branches to them. Posteriorly it gives off a small nerve towards the stomach. Antero-ventrally it gives off a nerve which, almost at once, penetrates underneath the circular musculature of the oesophagus. I have succeeded in tracing this nerve without any doubt in both sagittal and frontal sections. It passes down as

a single nerve to about half-way between the stomach ganglion and the labral loop. Here it radiates into five nerves (Fig. 10 A), of which two continue downwards and join the labral loop laterally, the remainder disappearing in the gut musculature. These two branches are joined together by a connective about the middle of their length. Their junction with the labral loop is marked by a small swelling, which may represent the visceral ganglion described by Hanström (1924, p. 33).

The sympathetic system shows many points of resemblance to that of *Astacus* as described by Keim (1915). The labral ganglion corresponds to the oesophageal ganglion of *Astacus*. In the latter it is connected to the circum-oesophageal commissures by two roots. In all my specimens of *Doloria* there is one large root on either side, but in one specimen there are indications of a double root, and in all there are minute nerves, apparently single nerve fibres, given off to the oesophageal musculature between the two ends of the labral loop.

The stomach ganglion is equivalent to the ganglion ventriculi superius. From both a nerve originates which runs along the aorta.

The connection between the stomach ganglion and the labral loop which lies inside the oesophageal musculature corresponds to the nervus stomatogastricus inferior of Keim.

The connection which passes through the frontal foramen appears to correspond to the two nerves, the nervus ventriculi impar inferior and superior, the former of which runs from the oesophageal ganglion to the brain, the latter running from the brain to the nervus stomatogastricus inferior and so to the stomach ganglion. However, these are two separate nerves, both originating from the brain. In all my preparations of *Doloria* which showed the sympathetic system clearly, this connection forms a distinct loop passing through the frontal foramen, and does not show any connection with the brain. However, it passes so close against the surface, that it is possible that a small connection in this region exists.

I could find no trace of a sympathetic system such as Lüders described in *Giganto-cypris* (1909, p. 137).

INTERNAL STRUCTURE

The main nerve fibre tracts are shown in Fig. 9. I have made no attempt to study this internal structure in detail, and have figured only those tracts which are conspicuous and which appear to me significant. The fixation of the nervous system is so extra-ordinarily good that, without doubt, a competent neurologist would be able to make out many more connections than shown in the figure.

The distribution of nerve cells is shown by the stippling in Fig. 9. The whole ventral surface is a sheet of neurones, and these extend up the sides to the extent shown in the figure. In addition, the dorsal surface of the fore-part of the brain and a dorso-medial area at the hind part of the nerve ring are both covered with nerve cells.

Among the neurones there are a number of giant cells but, apart from these, all are of approximately the same size. Thus, as Hanström points out for Branchiopoda (1928, p. 458), it is impossible to distinguish globuli cells.

The central body is well marked and occupies a typical position.

The optic lobes each contain two optic masses, the lamina and the medulla. From the latter a well-marked band of fibres passes backwards and then sharply inwards to the protocerebral bridge.

The protocerebral bridge consists of four glomerular masses.

The corpora pedunculata appear to be represented on each side by a small but distinct glomerular mass in the roof of the protocerebrum on a level with the protocerebral bridge. From this mass a band of fibres passes inwards and, looping round the optic tract, extends downwards to the outer edges of the central body. Here some fibres enter the latter. Others cross over and join the corresponding tract on the other side, and the remainder continue downwards and outwards to the antennulary nucleus to end in a glomerular mass which may be distinct or may be a dorsal lobe of the latter.

The antennulary nucleus is a glomerular structure occurring in the antennulary lobe. It consists certainly of two main lobes, an inner and an outer, the latter on each side being connected by a broad commissure—the main antennulary commissure. Certain fibres of the antennulary nerve pass directly between the two lobes and extend down the inner side of the nerve ring to the tritocerebrum, joining a thick bundle which emerges from the posterior lobe.

The nucleus of the nauplius eye consists of three glomerular masses embedded in the median mass of nerve cells formed from the fused optic lobes. The three nerves of the nauplius eye each connect with one of these glomeruli. Posteriorly each glomerulus gives rise to a tract of fibres which pass back between the constituents of the protocerebral bridge to the central body, and finally to the main antennulary commissure. In the latter, as well as in the central body, each tract gives off fibres to both right and left sides of these structures.

In front of the nucleus of the nauplius eye, between the nerves emerging from it, is a group of giant cells from which emerge the two nerve fibres to the frontal organ. Hölmgren (1916, p. 118) has described a similar arrangement in *Apus*.

There is a large commissure immediately in front of the central body, as well as a small one below the protocerebral bridge.

The position of the nuclei of the segmental nerves can be seen from Fig. 9. It will be noted that there is no distinct nucleus for the antennal nerve. The main bulk of the fibres of the lower antennal nerve pass inwards and then curve slightly towards the antennulary nucleus, but they form no compact nucleus. The region in which they terminate is a tangled mass of medium-sized giant fibres. The remainder of the fibres, apart from the giant fibres, pass backwards along the inside of the nerve ring to the tritocerebral commissure.

Although the third maxillary nerve does not enter the nerve ring direct, its fibres apparently pass through the stalk into the hinder part of the nerve ring, where they terminate in a nucleus which abuts against the nucleus of the first and second maxillary nerves. These nuclei are joined by a distinct commissure.

The sympathetic system has its own nucleus just in front of the mandibular nucleus.

The fibres of the anterior valve nerve, for the main part, pass into the tritocerebral commissure. A part, however, curve forwards towards the antennal region and join the tract of fibres from the posterior valve nerve.

The fibres of the adductor muscle nerve pass directly into the tritocerebral commissure, where they terminate in an ovoid mass which, since it has the same appearance as the central body of the brain, I am calling the tritocerebral central body. Close behind this body, but distinct from it, is another neuropilem mass, and behind the latter still a third but not so distinct a mass. Since this region consists of the extremely condensed ventral chain, these centres must correspond to the "sensorisches Ventralneuropilem" which Zawarzin has figured for the insect *Aeschna* (1924).

GIANT FIBRE SYSTEM

In addition to the commissural tracts and centres of co-ordination, there exists in the nervous system of *Doloria* a complicated system of giant fibres. These are undoubtedly typical neurochord cells, firstly because of the immense diameter of their fibres, and secondly because they are provided with a non-staining medullary sheath. The latter makes the fibres particularly noticeable when they happen to be cut transversely, but it also makes it easy to trace them in frontal sections.

In Fig. 9 I have drawn the most conspicuous of these fibres but, actually, there are a great many more which are not so thick. In fact, there seem to be all sizes from the enormous fibre emerging from the lower antennal nerve down to the fibres of normal size—no longer giant. Thus the dorsal region between the antennulary and the indistinct antennal nuclei is a complete tangle of medium-sized giant fibres.

The largest of the giant fibres are connected with the antennae. The dorsal antennal nerve appears to consist of a bundle of five (Figs. 9, 11). These are labelled *a*. They can be traced outwards to the antennal basal ganglion, through which they pass, to the immense muscles on the median face of the limb. The individual fibres can be traced into the cytoplasm which covers the outer surface of the muscles (Fig. 11). They appear to end blindly, there being no special end organ. Internally they can be traced to a dorsal region on a level with the anterior valve nerve, where, after giving off a few branches, they end. I could not find their cell bodies, but just in front and above the antennal nucleus there is a group of very large cells, and these may represent their cell stations.

The very large giant fibre *b* which runs in the lower antennal nerve innervates muscles on the outer side of the limb, and internally terminates in the same region as the fibres from the upper antennal nerve. In addition, it gives off a branch to the antennal nucleus.

Although, as I have just stated, I could not find the cell bodies of these fibres, I feel certain, from a careful study of the antennal basal ganglion, that they are not to be found there. They must be somewhere within the nerve ring, and their fibres must represent the motor elements of the big swimming muscles. I am hence calling the region where they terminate internally the antennal motor nucleus.

On either side of the tritocerebral central body, there is a giant cell which gives rise to the giant fibre *c*. This crosses in the tritocerebral commissure to the other side of

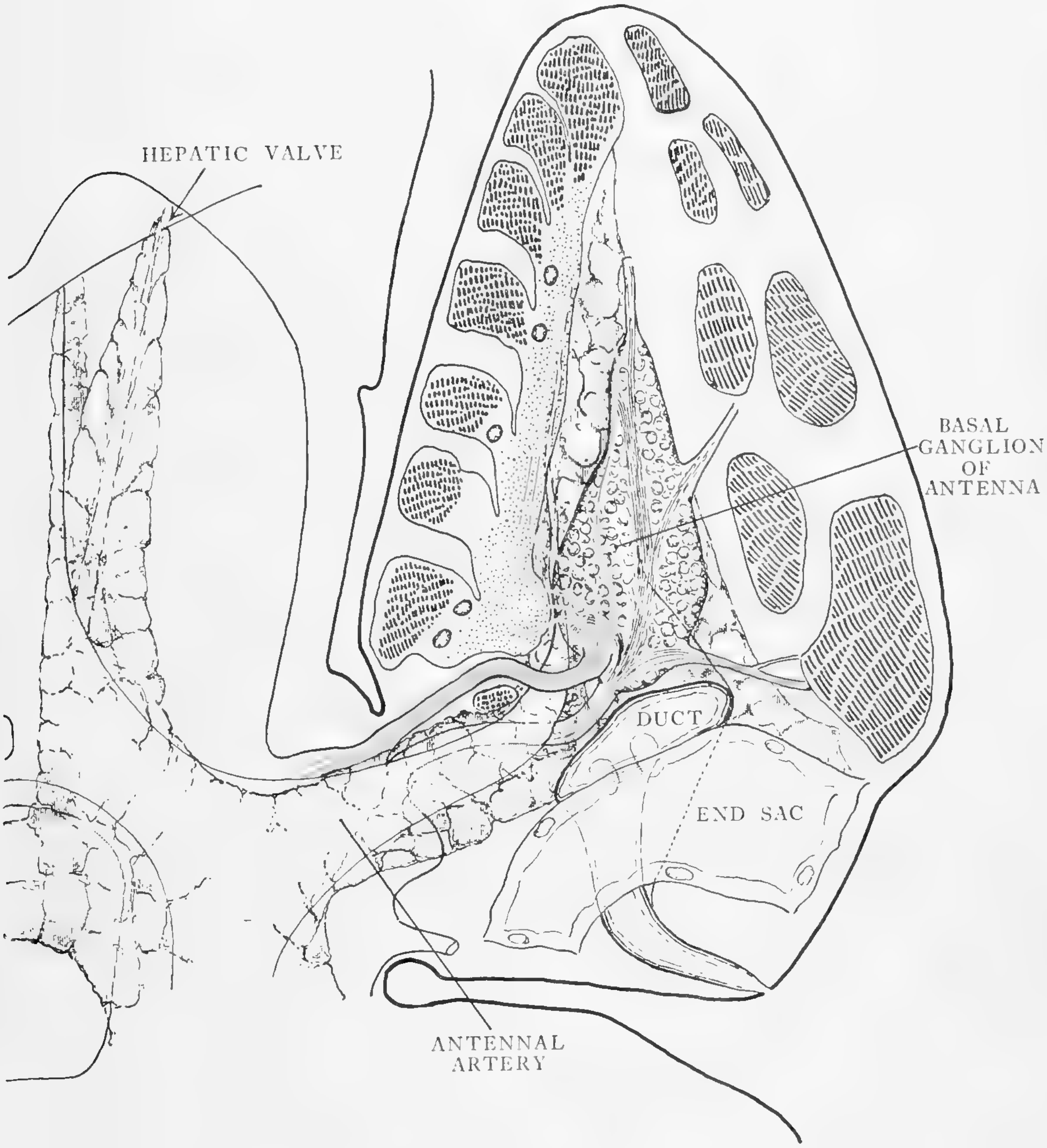

Fig. 11. Semi-diagrammatic view of section through base of antenna to show the antennal basal ganglion, antennal artery, the giant fibre system of the antenna (green) and the antennal gland. (× 300 approx.)

the body and, after bending slightly backwards, curves forwards to end in an arborization in the antennal motor nucleus.

A pair of giant fibres *d* extend forwards from the antennal motor nucleus, and cross each other just in front of the frontal aperture of the brain. Each fibre at once bifurcates,

sending a branch forwards and a branch backwards. The latter terminates in the lateral part of the nerve ring, after having given a branch to the antennal nucleus. The anterior branch extends forwards as far as the posterior mass of the protocerebral bridge in which it terminates. In addition, it gives rise to a branch which crosses to the other side of the body and terminates in the central body. I could not determine the cell bodies of these fibres.

Other fibres which I have labelled *e*, *f* and *g* appear comparatively simple, and their position can be seen from Fig. 9. Underneath the cell bodies labelled *f* in the tritocerebral commissure there is a bundle of medium-sized fibres extending up to the antennal motor nucleus, but I could not find any cell stations.

The giant fibre system is undoubtedly, as in other Crustacea in which such a system has been described, a co-ordinating system for linking up the two sides and the various regions of the body. From the fact that the majority of the fibres terminate in the antennal motor nucleus, it appears probable that the system is a special development for correlating the activities of these limbs with the activities of the other parts of the body. The antenna is, of course, immensely more powerful than any other limb, and it is the main, if not the only, swimming limb. Hence it is not surprising that its nervous mechanism should have such an elaborate intercommunication system with the rest of the nervous centres.

In addition to the giant association fibres there are the giant motor fibres of the antenna. Such fibres have recently been described in detail by Johnson (1924) in *Cambarus*, but apparently he did not trace them to their termination. In *Doloria* they can be traced without any doubt to their endings in muscle. If they represent the only motor elements to these muscles, and that seems highly probable, then, as Mr Pantin has pointed out to me, the degree to which the muscles can be stimulated is very much limited.

SEGMENTAL EXCRETORY ORGANS

From recent accounts of the Ostracoda, it is clear that the question of the occurrence of segmental excretory organs in the group is still very obscure. Thus Klie (1926, p. 20) states that fresh-water Ostracods possess three pairs of segmental excretory organs. He mentions the antennulary gland which was originally described by Bergold (1910). This I showed in 1925 was not an antennulary gland, as it occurred in the antenna. The antennal gland he describes is the shell gland of the Cyprids and again, in the same paper, I demonstrated that this could not be considered as a segmental organ for the reason that a true antennal gland, having the typical constitution of a segmental excretory organ, occurs alongside the shell gland. It is a larval organ and disappears after the fourth larval stage. He correctly describes the maxillary gland which was first fully described by Bergold (1910) and subsequently by myself (1925).

In a subsequent publication Klie (1929, p. 37) is still more obscure. He describes a gland "zweifellos als Nephridium anzusprechen" opening at the distal end of the stem of the antenna, but unfortunately he does not say in what form this occurs.

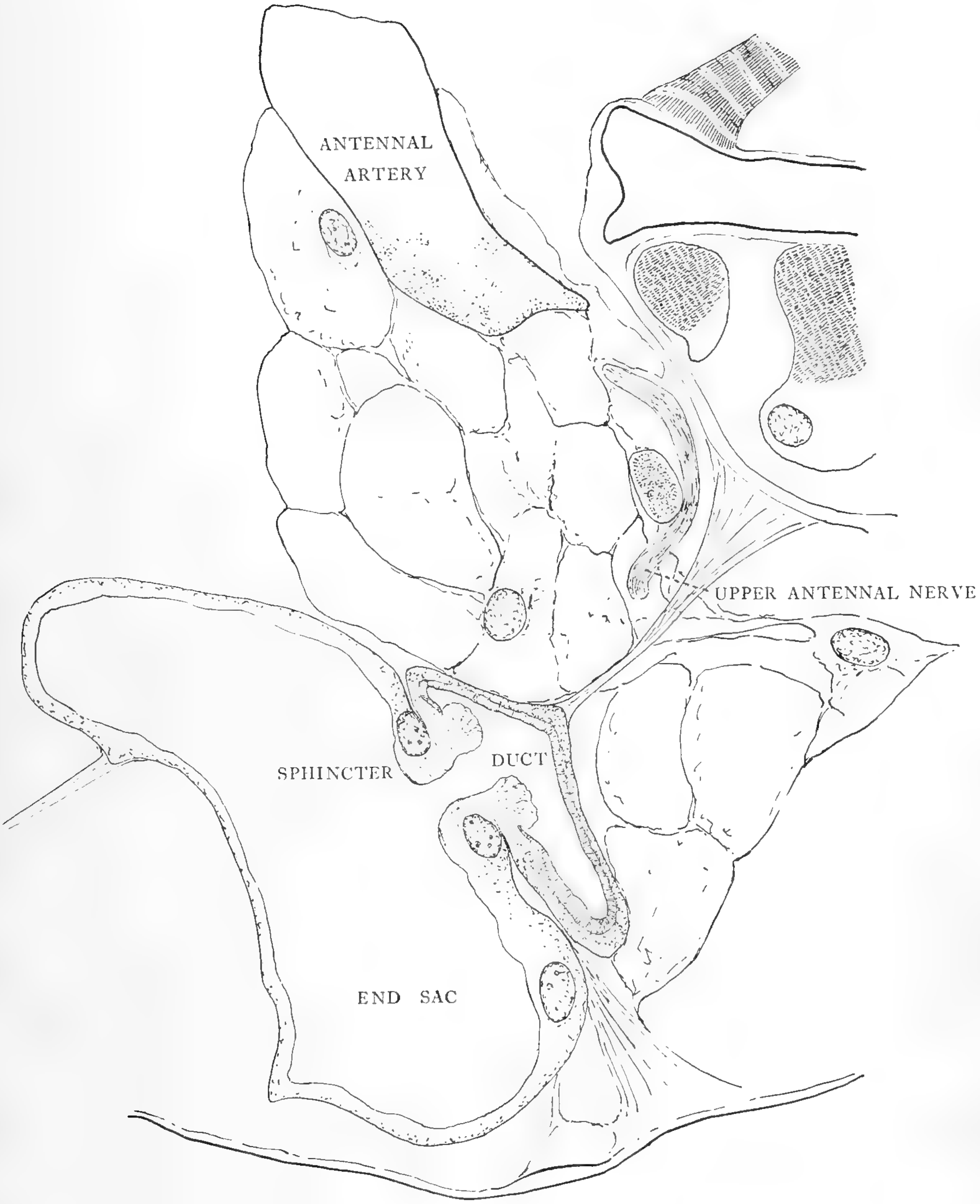

Fig. 12. Frontal section through antennal gland, showing sphincter between end sac and duct. (× 685.)

Both Klie (1929) and Müller (1927) describe various glands as excretory organs in marine Ostracods. Thus they both describe two rudimentary "nephridia" as occurring at the bases of the second and third pair of walking legs of *Paradoxostoma*. But there is no evidence at all that any of these organs, which are probably ectodermal glands, are even excretory in function, let alone serially homologous with the established segmental excretory organs of other Crustacea.

By the term "segmental excretory organ" I do not mean to imply that I know such a structure to be definitely excretory in function. It is a morphological term which has acquired a definite meaning. It implies in the Arthropoda a structure, segmental in value, which exhibits an end sac and a duct leading to the exterior, or else an organ about which there is definite evidence to indicate that it arose from such a structure. Further, in the Crustacea, it has never yet been shown that such organs occur in segments other than the antennal and maxillary and, hence, in this group, there is additional need for caution in describing organs as segmental excretory organs outside these segments.

In the Cypridinids no organ has ever before been described which, on the grounds I have just explained, could be homologized with the segmental excretory organs of other Crustacea. In *Doloria*, however, I have found a typical antennal gland and, although I have not examined my sections fully, the same gland occurs in *Gigantocypris*. Thus, in the Cypridae, there is a larval antennal gland and a maxillary gland in the adult. In the Cypridinidae there is an antennal gland in the adult and there is no trace of maxillary gland.

The antennal gland occurs in the posterior part of the basis of the antenna (Figs. 11, 12), close behind the antennal basal ganglion. The duct opens to the exterior by a minute pore at the postero-lateral angle of the joint. It broadens out as it passes forwards and then turns sharply upwards along the anterior face of the end sac. It is apparently intra-cellular, as I could only find three nuclei which were definitely in its walls. The lumen is, however, wide and the walls consist of a vacuolated outer layer separated sharply from an inner homogeneous or striated layer. The walls exhibit the same general appearance that I described for *Estheria* (1924) and figured for *Chirocephalus* (1926 *b*, Plate 22, fig. 2).

The entrance of the duct into the end sac is guarded by a muscular sphincter valve. The myofibrils are very distinct, but I could not be quite certain as to the number of cells forming the sphincter. I believe it is three, in which case it agrees with the similar sphincter in the maxillary gland of *Cypris* (Cannon, 1925) and the antennal gland of *Chirocephalus* (Cannon, 1926 *b*). The lips of the sphincter bulge into both end sac and duct, but most markedly into the latter (Fig. 12). In section it appears similar to the valve which we described in *Anaspides* (Cannon and Manton, 1927, Fig. 3) and which Vejdovsky (1901) described in *Niphargus* and *Gammarus*.

The end sac shows the typical structure for a segmental excretory organ. It consists of a thin-walled sac lying dorsally like a saddle across the duct. The cells constituting its walls are vacuolated on their inner faces, and contain a layer of spherical bodies in their outer layer which stain dark red in Mallory.

SUMMARY

It is suggested from a comparison of the limb arrangement of *Doloria* with that of a Cyprid, that the principle of feeding is the same in Cypridinids as in Cyprids, but that the limbs which carry out the various processes involved in the feeding mechanism are not in all cases homologous. Thus a food stream through the shell is produced by the vibratory plate of the maxillule in the case of a Cyprid and of the maxilla in a Cypridinid.

The skeletal stability of the body of *Doloria* centres on the powerful adductor muscle which connects the two valves. The limbs are connected to a massive endosternite, which forms the tendon between the right and left halves of this muscle, by a series of strong apodemes. In addition to this endoskeleton, the limbs and paired eyes are supported by a system of articulating sclerites which radiate from the attachment of the adductor muscle to the valves.

The dorsal body wall forms a soft flexible dome between heart and caudal furca. It is peculiar in that its musculature consists of a chequer-work of muscles, formed of the dorsal longitudinal muscles and a series of circular muscles lying close inside the ectoderm, both sets of muscles being connected to the cuticle. It is suggested that the latter are of ectodermal origin.

The globular heart, which possesses one pair of dorsal ostia, is slung on a muscular pericardial floor. Its walls fuse with the latter in three places, where splits occur which are bounded by myofibrils and which act as valves from the heart. A pair of these lead directly into a system of ramifying channels in a parenchymatous tissue which surrounds the gut. The third opens into an aorta.

The aorta leads into a circular vessel surrounding the oesophagus which opens into the body cavity underneath the endosternite. In addition, it gives off antennal arteries which can be traced to their termination in the protoplasm of the powerful swimming muscles in the bases of the antennae.

The whole system of blood vessels is provided with a series of muscles running in their walls (not circular muscles), or attached to their walls by which they can be distended or collapsed. In addition, there is a pair of muscular valves at the point where the main vessels open into the body cavity. It is suggested that this muscular system is an accessory circulatory mechanism, and, from a study of the arrangement of the muscles, it has been possible to suggest the actual mechanism by which the blood is forced round the body. The heart does not appear to be essential, and this is significant from the fact that in many Ostracods the heart is absent.

The gut musculature consists of a chequer-work of fibres which appear to be homogeneous, showing no trace of striation.

The compact nervous system is peculiar in that a basal ganglion occurs in each limb. A well-defined system of giant fibres is present, most of which are, as usual, associative elements, but some are apparently motor neurones which can be followed to their termination in the large muscles of the antennae. A well-defined sympathetic system is present, and shows a marked similarity to that of *Astacus*.

The chief features of the internal structure of the nervous system are described and figured. The tritocerebrum is peculiar in that a central body occurs in the tritocerebral commissure.

The segmental excretory organs are antennal glands, and not maxillary glands as in the Cypridae. The glands show a typical structure, and there is a well-defined sphincter between end sac and duct.

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PLATE VI

Cypridina (*Doloria*) *levis* Skogsberg. Lateral view after removal of left valve. A diagrammatic key to the parts shown is given in text-fig. 1, p. 440.

CYPRIDINA (DOLORIA) LEVIS.

PLATE VII

Photomicrographs (× 140) of sections of *Doloria levis*.
Fixation: figs. 1, 2, 3, 4 and 6 Dubosq-Brasil; fig. 5 alcohol.
Stain: Mallory.

Fig. 1. Frontal section through brain and supraneural vessel. *a.* antennal artery; *b.* supraneural ring vessel; *c.* valve in supraneural ring vessel.

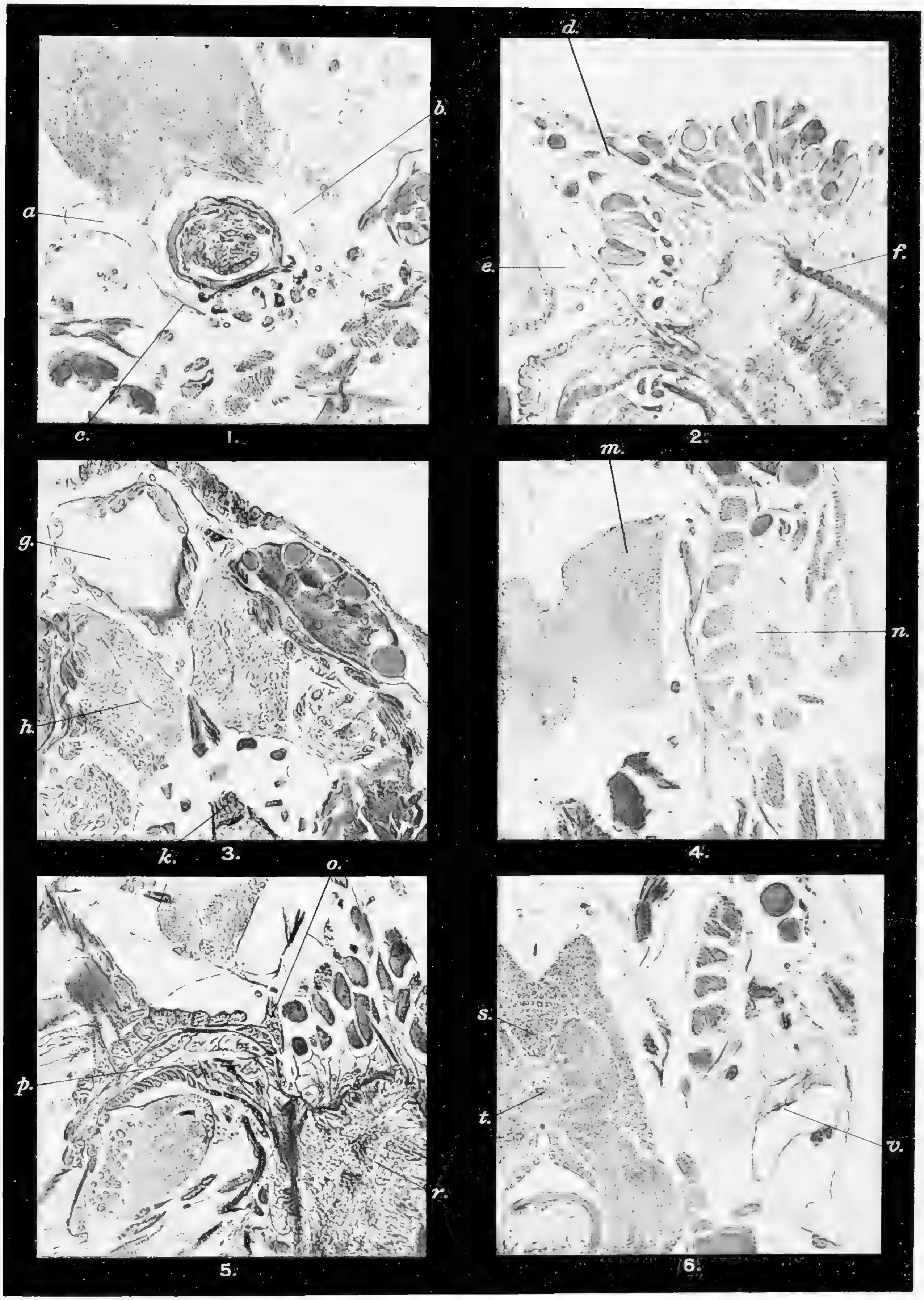
Fig. 2. Parasagittal section through gut parenchyma leading up to hepatic valve. Left side of photograph is anterior. *d.* gut parenchyma leading to hepatic valve; *e.* antennal artery; *f.* gut musculature.

Fig. 3. Frontal section through optic tracts and stomach ganglion. *g.* heart; *h.* optic tract; *k.* stomach ganglion.

Fig. 4. Oblique frontal section through base of antenna, showing antennal basal ganglion and giant fibres entering muscle. *m.* lamina of optic lobe; *n.* giant fibre passing from basal antennal ganglion (right) to muscle (left).

Fig. 5. Accurate sagittal section. Top of photograph is anterior. *o.* stomach ganglion; *p.* oesophagus; *r.* stomach.

Fig. 6. Frontal section through base of antenna, showing sphincter of antennal gland. *s.* nucleus of nauplius eye; *t.* central body of brain; *v.* sphincter valve of antennal gland.



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